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PART ONE

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ELEMENTAR
GEOGRAPHY

PART I

BY

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PREFACE

In the gradual evolution of elementary courses of study the subject of geography has found a place befitting its present-day importance; and there has come to be a fairly general agreement as to what constitutes the science of geography, its proper aims and objects, and the subject matter appropriate, under given conditions, to the several grades. It may not be amiss, therefore, to state some of these principles which are matters of general agreement — not that they are permanent or infallible, but that they may, while serving as a guide for the teacher, be continually studied, tested, modified, and adapted to new conditions and new truth.

First. — The Science of Geography:

1. Geography treats of the earth as the home of mankind.
2. Geography is a present-day science, dealing with the earth as it is to-day, with races and nations in their present state of civilization, and with their present social, industrial, and political environment.
3. Geography is a composite science, drawing its facts from mathematics, astronomy, physics, geology, botany, zoology, etc., but employing these facts only so far as they elucidate the relations which man bears to the physical world.
4. Geography as a science, is prevailingly inductive, leading from observed facts to general laws.
5. The divisions of geographical science commonly recognized are (1) mathematical, (2) physical, (3) political, (4) industrial, (5) commercial, and (6) historical geography.

Second. — The Aims and Objects of Geographical Instruction:

1. To impart a knowledge of such geographical facts and principles as are essential features of the pupil's environment.
2. To cultivate a careful and thoughtful observation of geographic phenomena.
3. To develop the power to explain geographic phenomena by reasoning clearly from cause to effect.
4. To cultivate the imagination of the pupil, so that maps and pictures shall be of real assistance in comprehending the actualities for which they stand.
5. To make a practical application to the affairs of life of the facts and principles gained.

Third. — Selection of Subject Matter: Geographic material, appropriate at any given stage of the pupil's progress, must conform to the following standards:

1. It must be such a part of man's environment as exerts an important influence on his life and activities; or it must be the result of man's contact with that environment — that is, the activities themselves.
2. Subject matter that is essential to the future progress of the pupil, must be included in the work of the several grades.
3. Subject matter that is essential to the understanding of the affairs of life or which is a necessary part of the equipment of an intelligent human being, should be included.
4. An essential criterion for all subject matter is that it be adapted to the capacity of the pupil at any given stage.

Fourth. — Methods of Instruction:

1. The proper basis of geographical instruction is the present knowledge and immediate environment of the pupil. This basis must be utilized by the teacher in introducing new matter.
2. Geographical instruction begins with the pupil's home surroundings and proceeds outward, explaining the unknown and distant by what is familiar and near at hand.

3. Simple topics of a broad, general nature should first receive attention. Examples of such topics are — food, clothing, shelter, occupations, travel and transportation, soil, land and water forms, etc., etc. A careful oral treatment in the classroom should stimulate the pupil to observation and research. In this way the foundations for future progress are laid. Later discussions growing out of the analysis of these simple topics will be more elaborate, developing causal relations, general truths, and, incidentally, relations to other subjects of the school curriculum.
4. The fundamental topics of geography will be constantly elaborated in subsequent lessons, through classification and comparison, and will serve as centers about which to organize the growing fund of geographical knowledge.
5. All geographical instruction, in order to be successful, must be clearly objective. Excursions for purposes of observation and study, maps, pictures, collections of specimens, models and drawings must be constantly employed to give clear and concrete notions of things.
6. The importance of books of reference should be taught in the earlier stages by having interesting and pointed selections read in the class; in the more advanced work, statistical tables, atlases, guide books, railroad folders, tourists' booklets, year-books, and other reference works may be utilized.[1]

The Foundations of Geography. Realizing the immensity of the geographic field and the proper functions of the textbook, the aim in the present series has been to *lay the foundation*, rather than to furnish a compendium of information;—to establish so thoroughly the habit of thoughtful observation and research that the course of study in geography shall be a delight to the pupil and a source of satisfaction to the instructor; or, as McMurry puts it, "To throw the children into the midst of men's active employments and into nature's varied scenery, and in some suggestive way to anoint their eyes with the power of insight." The First Book, however, provides a complete course of study of elementary grade, in order that children who leave school in the middle of the course may be fairly well equipped, geographically, for the business of life. The limitations of space have made it imperative to treat a few topics only at considerable length, but additional work has been suggested at the end of each lesson to be used as conditions warrant.

Special Features — A Pupil's Book. The chief aim has been to prepare a book which should call for a minimum of labor on the part of the teacher and a maximum of labor on the part of the pupil. To this end the greatest care has been taken to make the requirements of each lesson intelligible. A special introduction has been written for the pupil, and in every case when a new kind of subject matter is taken up, its nature is fully explained in the notes on "HOW TO STUDY," placed at the foot of the first page treating of the new subject. Care has been taken in the Map Studies, Reviews, Observation Work, and Supplementary Reading, to use the simplest language and to make only such requirements as may reasonably be expected to fall within the experience or comprehension of the pupil.

Treatment of Home Geography. The theses laid down above, under "Methods of Instruction" have been rigidly adhered to, and more space has been given to "Home Geography" than in any other American textbook which has come to the attention of the author. After a series of introductory pictures on home life under various typical conditions, a somewhat extended discussion is presented, of the chief elements of human environment, including the more familiar forms of land and water, the elements of climate, and the occupations characteristic of both city and country. These discussions apply to type forms, and abundant provision is made for observational and experimental work which shall bring home the facts and forms to the experience of the pupil, no matter where he may live. Exact and careful

[1] For a more extended discussion of methods, see *McMurry:* Special Method in Geography. *King:* Methods and Aids in Geography. *Geikie:* The Teaching of Geography.

definitions of nature forms are given at proper places in the text, and it is advised that the concepts formed by the pupil from the discussions, be compared and harmonized with these more formal statements.

Paragraph Heads and Bold-Face Type. In Parts I and II the text matter has been carefully organized into paragraphs of moderate length, each of which has received a heading in bold-face type. This heading constitutes the paragraph topic and is, in general, the sole topic treated; but in case any subordinate topics occur in the paragraph, they also are set in bold-face. These topics form the proper subjects for discussion in the classroom. In Part III, the paragraph heads are less specifically stated, and the pupil is expected to classify the content of the paragraph under appropriate sub-heads. This practice should be insisted on until proficiency is attained. It should be a regular part of the preparation for the next day's lesson to select the topics which are to be made the basis of the recitation and discussion, for no other device will so greatly facilitate the "learning of the lesson."

Fullness of Treatment and Incidental Teaching. The author is not in accord with the "strict constructionists" in geography, who would rigidly exclude from the textbook everything that is not manifestly a "life response" to natural conditions. A large amount of material not strictly geography, though closely related to that subject, has been freely introduced from history, astronomy, and the physical sciences, as well as some things which are matters of general interest and which are most easily taught in connection with geography. We believe with the highest authorities on the pedagogics of geography that too concise a treatment, or the *paragraph* style, means a paucity of information and defeats the object of a good textbook. Such treatment of the subject may be desirable for the pupil who is "cramming" for an examination, but it contributes little toward enlisting interest and enthusiasm. A full treatment is indispensable to an interesting story, and while it is impossible in a textbook to indulge the story-telling propensity too freely, an abundant supply of stories has been suggested in the "Supplementary Reading" and the "Suggestions for Additional Work." It is not expected that any class will do all the work provided, but enough should be selected from the variety of exercises presented to impress the pupils with the fact that geography is a live subject and to encourage them to associate closely with the geography lesson many matters of current interest.

Selection of Material and Method of Treatment. The author has studiously endeavored to follow out the principles enunciated at the beginning of this article — to emphasize the human element of geographical data, to approach new topics from known standpoints, to link cause and effect, and to make the pupil *think* independently of the book. The effects of surface, climatic conditions, and natural resources are constantly illustrated, and the pupil is encouraged to search for the *reasons of things*. It is for this purpose that the story of "Millville" is told at some length (*page 54*). The chapters on "City and Country Life" and "Occupations," and the material occurring in various places in the text on manufacturing conditions, have the same purpose in view. The importance of the human element in geography in its reactions upon natural conditions is given due prominence in explaining present geographical conditions. (See *pp. 201, 214, 270.*) In general the policy has been to limit the text to such facts as the pupil is capable of coördinating with his present stock of knowledge, or such as are essential in building the chain of geographical sequences. Of course, many facts are included because their intrinsic or practical value renders them indispensable to the pupil's intellectual training and equipment.

Maps and Illustrations. The usual practice in school geographies is to have each map *occupy a full type page*, with the result that there are as many *different scales as there are maps*. While this method is convenient from the standpoint of economical manufacture, it is sadly misleading to the younger pupils, who easily get the idea that all continents and their divisions are of the same size. Massachusetts seems just as large as Texas, and other parts of the world as distorted in a similar manner.

The maps of the present book are a radical departure from this method. Three map

scales have been used: the first applies to the continents; the second, to the larger countries of the world; and the third, to the groups of states and the countries of Europe. In addition to this, each map contains some country taken from a map drawn to a different scale, so that the pupil cannot fail to obtain correct conceptions of the relative size of different countries.

After much deliberation the publishers have decided to place all maps to which frequent reference is made, together, at the end of the book. The comparative studies constantly occurring make it necessary to turn frequently to the maps of continents and countries other than those immediately under consideration, and this can be done most conveniently if all such maps are found together; and, incidentally, much wear and tear on the book will be avoided. To further the same end, also, the Map Studies have been placed near the maps, instead of in the text. It is believed that this one device will double the life of a book, inasmuch as the pupil almost invariably will turn the pages — not once but *many times* to find the answer to a single question.

The illustrations have been confined to such as are of definite geographical significance and really *illustrate* the text. Each picture has its own lesson and should receive equal attention with the text. The most important function of the picture is to train the imagination, and the learner should be encouraged to draw conclusions as to the nature of the country, people, or industries represented by the illustrations.

Size of Book. The large number of maps and illustrations, and the unusual size of the more important pictures, together with a fulness of detail in the text, have resulted in a book considerably larger than the average elementary geography; but it should be noted that the material is so grouped and arranged by means of sections, paragraph heads, type sizes, and numbered questions and exercises, that any part of it not adapted to any particular class of pupils or section of country may be omitted or deferred for later study.

HOW TO STUDY — TO BE READ BY THE PUPIL

You began to study geography long ago in the "Book of Nature." When you first noticed the place of sunrise and sunset, you were learning from Nature's Book. When you saw the farmer plant his crops, cultivate them, and harvest them, you learned that spring is the seed time of the year, early summer, the growing time, and autumn, the harvest time. When you learned that the long days of summer bring hot weather, and the short days of winter, cold weather, and when you watched the winds driving the clouds across the skies, and the clouds sending down rain to moisten the earth, you were learning about *climate*, which is one of the most important things in geography. When you saw the water rushing down the hills and streets, carrying its load of sand and mud, you were learning how *soil* is formed, out of which all plants grow. When you learned the names and uses of the plants and animals about you, you were studying geography.

You began to study *manufacturing* when you first saw the tailor making a coat or the carpenter building a house; or when you visited some factory with its busy machines making cloth, shoes, or other articles. Manufacturing is a part of geography and you can study it best by watching men and machinery at work.

When we study geography from books we must keep up the habit of *observation*. When we read in this book about the soil, the hills, valleys, brooks, and other things found in nature, we must study these things out-of-doors if we are to remember what we read. The questions and exercises at the end of each lesson will tell you what things to observe.

A story is told about a boy, whose name was "Sharp Eyes." He studied geography in his walks over the hills and fields, and along the brook in the meadow. Each day he found something new to learn. He was always learning more and more because he took with him on his

walks two good friends named "Why" and "Thoughtful." Every time Sharp Eyes saw something new, "Why" asked him all sorts of questions about it. If he could not answer the questions, "Thoughtful" would show him that by thinking hard he could find out the answer for himself.

If you wish to learn a great deal, you must be Sharp Eyes, Why, and Thoughtful, all in one. Wherever you go you must make good use of your eyes and and ask "Why?" every time you see something you do not understand. Then, with the help of Friend Thoughtful you will discover the answer. If Thoughtful cannot give you the answer, you may make use of books or ask your friends and teachers; but be sure that in some way you find the answer. If you look sharp, ask questions, think hard, and study faithfully, you can be a good geographer or anything else that you wish to be.

HARMON B. NIVER,
BROOKLYN, *September* 1, 1915.

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FOUNDATIONS OF GEOGRAPE

FIRST BOOK

PART I. HOME GEOGRAPHY

I. FOOD, CLOTHING, AND HOMES

Geography Begins with the Study of Home Life. Geography is the study of the earth, and of the people who live upon it and make it their home; but the earth is a very large place and is the home of many kinds of people, who differ not only in color and language, but in their whole manner of life.

We shall begin our study of geography by noticing some things about our own home life, and about the homes of people in different parts of the earth; then we shall try to learn something about the earth by the use of our own eyes.

The most familiar things about our home life are the home itself, the things we eat and wear, and the different kinds of work which we see going on about us every day.

Why People Must Work. To and in health, we need good clothing, and a house to live such things the **necessaries of** pare them and bring them to us, work everywhere in country and work on farms and in garde forests and mines, and some shops, and stores. Many t people are busy on ships and r on wagons and trucks, carryin place to place until they are br people who need them.

How Food is Obtained. necessities are food and drink them we could live only a short articles of food we obtain at

FIGURE 2. Cows grazing on a dairy farm.

dens and orchards furnish us vegetables and fruits. Farmers raise wheat, corn, rye, and other grains, which are ground into flour and meal for making bread, cakes, and pies.

FIGURE 3. Bottling milk for shipment to the city.

Dairy farmers keep cows for their milk. Some of the milk is made into butter and cheese, but most of it is put into bottles and cans and sent to the cities, where the milkmen leave it at the doors of their customers. Some farmers raise cattle, sheep, and hogs, to furnish us with beef, mutton, and pork. On poultry farms, chickens, ducks, geese, and turkeys are kept to supply us with eggs and poultry.

Some Things are Brought from Distant Countries. Other articles of food and drink are brought to us across the ocean from distant parts of the world. Our coffee and chocolate come from South America, and our tea and spices from China, Japan, and the East Indies. Dates and figs are shipped to us from parts of Asia; and cocoanuts, pineapples, bananas, and other tropical fruits come from the warm countries and islands south of the United States.

Our Clothing and What it is Made of. In summer, we wear thin clothing made of cotton, silk, or linen; but our winter clothing is made of warm wool and fur. The **materials** for clothing are obtained from both plants and animals. Cotton is found in the seed-pod of a plant which grows in the southern part of the United States and in other warm countries. Linen is obtained from the stalk of the flax plant, and silk is the thread spun by the silk worm for its cocoon. Wool is the thick hairy coat of sheep, goats, and other animals. It makes the best kind of clothing for cold weather. The hair of the camel, and of several smaller animals found in South America, is also used in making clothing.

FIGURE 4. A cotton field in the picking season.

All these materials are composed of slender threads, or *fibers*, which must be twisted into thread and woven into cloth, before they can be used to make our clothing.

The skins of animals in the form of leather and fur are also much used for clothing. Leather is made from the skins of cattle, sheep, goats, and deer. After the hair has been removed from the skins, they are soaked in a liquid which *tans* them so that they will not decay. They are then rubbed with oil to make them soft and pliable, and are dyed in various colors. Shoes, gloves, and many other useful articles are made of leather.

FIGURE 5. A flock of sheep in the State of Washington.

When the skins of animals are covered with thick, soft hair they are called **furs.** The seal, beaver, mink, and squirrel are some of the common animals whose furs are used for making clothing. Most fur-bearing animals live in cold countries.

Animals and Men Need Homes. Besides food and clothing, we need homes to protect us from the rain and cold. All animals have homes of some kind, where they can be safe from their enemies and rear their young. Birds and monkeys make their homes in the trees; rabbits, moles, woodchucks, and prairie dogs burrow into the ground; and the larger animals live in dens and caves among the rocks or among the thick trees and bushes of the forests.

We build our homes of wood, brick, and stone; but when we come to read about other countries, we shall find that men have many different ways of making their homes. In the open country and in small villages, the houses are usually built of wood; but in the business sections of large towns and cities most buildings are constructed of brick, stone, concrete, or steel, so that they may not easily take fire.

Homes in the Wilderness. The white men who first came to live in our country found the land nearly covered with forests. They had to cut down some of the trees to make clearings

where they could raise grain and vegetables; and with the logs they built cabins. Hunters, trappers, and lumbermen, who go into the woods to live, still build cabins of logs.

Where Materials for Our Homes are Found. In new or uncivilized countries men use building materials which are near at hand; but in countries which have steamboats and railroads, building materials are often brought from distant places. Lumber comes from the forests which are found in many parts of our country. Granite, marble, limestone, and cement are obtained from quarries, often many miles distant from the places where homes must be built. For building houses in cities, **bricks** are perhaps used more than any other kind of material. Bricks are molded out of clay, and baked in ovens until they are hard. These ovens, or *kilns*, are located near the clay beds, and the bricks are carried to the cities on boats or by rail. (See *Figure 24*).

FIGURE 6. A clearing in a pine forest and log home of a pioneer.

We Need Furniture. In our houses, we must have chairs, tables, and other articles. In the dining room and kitchen, we must have dishes and cooking utensils, and our sleeping rooms must have beds. Besides these and other necessaries, we have books, pictures, musical instruments, and other things to make our homes comfortable and attractive.

Our Homes Must be Lighted and Heated. We must have some way of lighting our homes at night, and of heating them in cold weather. Our great-grandparents obtained light from torches, candles, and oil lamps without chimneys. For cooking and heating, they built a great fire of logs in a fire-place at one side of the room. To-day, we have lamps of many kinds fitted with chimneys and shades. Some of these burn oil or gas, while others give out light obtained from electricity. We cook our food on stoves, which burn coal, wood, or gas, or we may use electricity for cooking as well as for lighting.

The wood for making our furniture and to burn in stoves is obtained from the forests: coal and oil are brought up out of the earth from mines and wells. From some of the coal, gas is made; and from the oil, we get kerosene to burn in lamps. Electricity is made at a power-house by means of machines called dynamos, and copper wires lead it into our homes. Candles made of tallow or wax are still used in many houses; they are also used in some churches, and as ornaments at Christmas and other festival days.

Many Things Must be Manufactured. Nearly all the materials for making clothing, and for building and furnishing our homes, must be *changed* in some way before they can be used. The flax, cotton, and wool must be made into cloth. Trees, rocks, and clay must be made into lumber, building stone, and bricks, before they can be used to build houses. Much of our food, too, is made from grain, and from the different kinds of plants, animals, and minerals. The work of making up the raw materials

into things useful for food, clothing, and shelter is called **manufacturing.**

Most Manufacturing is Done in Factories. Some of this manufacturing is done by carpenters, blacksmiths, shoemakers, and other mechanics, but the greater part of it is done in factories. A factory is a room or building fitted out with machinery for doing certain work. We have cotton, woolen, and silk factories, or mills, where cloth is made, and we have other factories for making hats, shoes, clothing, furniture, and a thousand other things needed in our daily life. The work of manufacturing employs more people than any other kind of work done in our country except farming.

Everything Comes from th we think for a moment about the articles mentioned in thi can easily trace it back to th course, it is plain enough tha flax grow from the earth; l mals also which we use for f plants which grow on the earl grass, the sheep and cattle co and we should have none of th which they furnish us. The is a part of the earth, and it with shellfish, and other fish eaten fresh or preserved in s food. Perhaps you can think c in which the ocean is useful to

REVIEW. (1) What three things does every one need? (2) Name some articles of food that are raised in gardens; some that grow on trees; some that are brought across the sea. (3) Name some animals that the farmer raises for food. (4) What does the farmer produce that helps to make our clothing? (5) Name articles used for clothing that are brought from distant countries. (6) Name several kinds of cloth and the materials from which each kind is made. (7) Name some animals that supply furs. (8) Name some of the uses made of leather. (9) What materials were used in making the house in which you live? (10) In building houses, what use is made of brick, iron, lead, tin, lime? (11) How is your home heated? (12) What kind of fuel is used? (13) How is your school heated? (14) Prepare a list of ten manufactured articles and the materials of which each is made.

OBSERVATION WORK. (1) If you have helped to care for a garden, describe the method of planting and cultivating it. (2) If you live in the country, describe the method of growing and harvesting wheat, corn, cotton, or potatoes. (3) Your teacher will tell you how butter, cheese, and condensed milk are made. (4) Watch the building of a house and notice the different steps of the work and the different kinds of labor employed. (5) Ask your father or teacher to take you to see the work on a farm or in a factory, and write about the things in which you were most interested. (6) Note the changes in a tree, especially a fruit tree, from early spring till late autumn. (7) Name some animals you have seen, and tell for what each is useful. (8) Name some objects that you have seen in a grocery window. Ask your parents or yc they came from. (9) Make a list of the in your garden or in some garden you Make a list of the articles on your din your parents or your teacher find out wh articles came from. Find out which c countries. (11) How many different ki you seen in your neighborhood? (12) birds or wild animals in your neighbo some of them to your teacher. If you d names describe them so carefully that tell you their names. (13) What kind seen people wearing as wraps? (14) V light-colored clothes in summer and da in winter? (15) Name the different l which some of the men you know are en your teacher what the country, where yo like one hundred and twenty years a people lived then. (17) After the teac how the people lived in George Washin a list of all the things you see, that V nothing about.

SUPPLEMENTARY READING. How We Are Fed; How We Are Cloth Sheltered. *Carpenter:* How the World World is Housed; How the World is Cl How Man Conquered Nature. *Murch* ers, Book vi. *Payne:* Geographical *Fairbanks:* Home Geography, pp. 100-1 and His Markets, pp. 60-107.

II. HOME LIFE IN OTHER LANDS

1. In Eskimo Land

The Cold Country North of Us. If you should travel a long distance to the north, you would come to a great salt lake, or ocean. Find its name on the map (*page 306*). The lands bordering on this ocean are covered with ice and snow for about ten months of the year. The sun is always near the horizon, and for about four months it does not rise at all, although it gives enough light for the people to find their way about. During this long winter the ocean itself is frozen over with a thick layer of ice. The snow becomes so deep on the hills and mountains that it slides off into the valleys, where it changes to ice.

Figure 7. An ice-stream, or *glacier*, entering the sea on the coast of Alaska.

Icebergs are Floating Mountains. Just before the short summer begins, the weather grows a little warmer, and the snow and ice begin to melt. The ice coat on the ocean breaks up and floats about on the water in great fields called *ice floes*. The ice in the valleys slides down to the ocean, where great masses break off with a roar like a burst of thunder, and float away as *icebergs*. Some of these floating ice mountains are over a thousand feet thick, and their tops rise several hundred feet into the air. Many of them drift out of the cold ocean into the waters farther south, and are dangerous to vessels, which are sometimes wrecked by striking against them.

There are Few Plants. In these cold lands, the ground is frozen to a great depth throughout the year; but in the summer after the snow has melted away, the earth thaws a little at the surface, and a few plants whose seeds have remained over from the previous summer, spring up and grow. There are no trees or shrubs in this cold country, because their roots cannot strike deep enough into the frozen ground. The only plants are mosses, dwarf willows, and different kinds of grasses, some of which bear bright flowers and berries.

HOW TO STUDY. In the first lesson we read about the people of our own country — about their food, clothing, and homes. In this lesson we shall read about people who live in far distant parts of the earth, and whose manner of life is very different from ours. As you study the Eskimo, the Negro, and the Arab, you must notice the ways in which they differ from ourselves. In this way you will learn the difference between *civilized*, *savage*, and *barbarous* peoples.

People who obtain their food by hunting and fishing, who dress in the skins of animals, or wear little or no clothing; who live in huts, and who have no schools or books, are said to be in the **savage state.** People who make a living by keeping cattle, sheep, and other domestic animals; who make cloth, pottery, and other simple things that they need, chiefly by the aid of their hands; who build no railroads or factories, and have little education, are said to be in the **barbarous state.** People who cultivate the soil, engage in manufacturing and commerce, make use of machinery, and have schools, colleges, libraries, and churches, are said to be in the **civilized state.** Of course, some people are more *highly* civilized than others, and there are many kinds of savage and barbarous life. As you go on with your study of geography you will learn how to decide more exactly as to what *stage of civilization* any people are in, about whom you may read.

Figure 8. Animals of the Arctic regions.

Animals are Abundant. While there are few plants because of the cold, there are many animals, especially those that live in the water all or a part of the time. Among them are the whale, walrus, seal, and many kinds of fish. The whale is the largest animal on the earth. The walrus is about as large as a grizzly bear. He has a thick, rough skin, and two long, sharp tusks grow from his upper jaw. The seal is famous for its thick coat of fur. The land animals, too, have thick fur to protect them from the cold. The polar bear is the largest of them, and there are wolves, dogs, and foxes. The Arctic hare is a small animal which is highly prized for food. Then there are many kinds of birds which obtain their food from the water.

Eskimos Live in the Cold Countries. The inhabitants of these cold lands are called Eskimos. They are of medium height, strongly built, and have black hair and eyes; their complexion is yellowish-brown, like that of the people of Northern Asia. They live by hunting, for they can not raise corn or wheat to make bread. They have no cotton or wool for clothing, and no wood for making houses or furniture, except the timber and wrecks of ships which is thrown up on their shores by the ocean. Their food and clothing are obtained from the animals which they kill. They cannot read or write because they have neither schools nor books. All their time is spent in getting enough food to keep them alive during the long winter, and in making their huts and clothing.

Food and Clothing. The favorite food of the Eskimos is the flesh and fat of the seal and the walrus, and the fish which they catch on their bone fish-hooks. In the winter they hunt the polar bear and other animals which roam about on the frozen land, and ice-covered ocean. You may wonder how people can live without bread, fruits, and vegetables; but in cold countries one can get along without these things and live entirely on animal food. The oil

FIGURE 9. Giant icebergs float down from the Arctic regions. Compare in size with the ocean steamship.

and fat of animals help to keep the body warm. You would not relish a drink of oil or melted fat, but no food pleases the Eskimo better, and he likes the flesh and fat of animals even when it is raw or frozen.

FIGURE 10. Eskimos building a kayak.

The Eskimos' clothing is made entirely of the skins of animals. The women make soft garments for the babies and younger children by sewing together the young seals' velvety skins. Their needles are made from the bones, and their thread, from the sinews of animals. The men and boys wear shirts, trousers, coats, and boots made of bearskin or sealskin, and caps and mittens of the same material. The women's clothing is made of the skins of birds, foxes, and seals, neatly sewed together, and their coats have hoods in which they carry the babies.

How the Eskimos Hunt. For hunting the seal, the Eskimo has a long, narrow canoe, called a **kayak,** and a spear tipped with a sharp point made of bone. The kayak is made by covering a light frame of wood and bone with the skins of seals or other animals. The top is covered over at both ends, leaving an opening or *well,* in which the hunter sits. The kayak is easily overturned, and much practice in the use of the paddle is required to manage the hunter sees a seal poking h of the water, he hurls his spea tached to the handle of the cord which the Eskimo keeps when he throws the weapon; b this cord he can pull in the sp poon, as it is called, and capture

In the winter, hunting parties go over the ice on sledges draw These sledges are made in the s the frames of the canoes, and the the dogs is made of strips of walru When they find a bear or walrus o dogs surround it and prevent its the hunters kill it with spears. Wit their dogs the Eskimos also catch ha and they sometimes hunt birds wi

The Eskimo's Home. The Es the walls of his winter home o or driftwood and covers it e with a thick layer of earth, looks like a little rounded hill more like a cave than a house; one room not more than ten or wide, and just high enough for t Eskimos to stand in. There are windows, the only opening being sage or tunnel, through which on crawl at a time. Sometimes an o

FIGURE 11. Eskimos harpooning seals.

at the top of the hut to let in a little light. (Read "The Wide World," *pages 114–122*).

A raised place covered with furs serves for both a seat and a bed. To obtain heat to cook his food and to warm his hut, the Eskimo makes a lamp which burns the oil obtained from walrus fat. The lamp makes a great deal of smoke and does not give out much heat; but the Eskimos do not seem to mind the smoke, and they are so accustomed to cold that they can sleep very comfortably in a bank of snow when the weather is not too cold. As several families often occupy the same hut, the heat of their bodies helps to keep it warm.

FIGURE 12. Eskimos building an igloo.

Igloos are Snow Houses. When the Eskimos wander from place to place in search of game, they often leave their stone houses vacant. Then, any family that finds one of them empty, may live in it. During the hunting and fishing season in the summer, they live in tents made of skins or in cabins built of wood like that shown in Figure 10. When the hunters are absent on their long winter trips, they make igloos out of blocks of hard snow. The blocks are put together in the form of a beehive, and there is a tunnel-like entrance as in the stone huts, but no other openings. These snow igloos melt away during the summer and must be rebuilt if the hunter wishes to stay in the same place during another winter.

Teaching the Children. The little Eskimo girls are taught to cut out garments from skins and sew them together. Their mothers teach them also how to cook and take care of the home. The boys learn very early to throw the spear and to shoot with the bow, because their chief business when they grow up will be hunting. The fathers carve playthings out of bone or walrus teeth, and build little sledges and boats for the boys.

FIGURE. 13. Eskimo children.

SUPPLEMENTARY READING. *Peary:* The Snow Baby; Children of the Arctic. (See also reference list on page 17).

2. THE HOME OF THE BLACK RACE

The Black Race Lives in a Hot Country. Far away to the southeast across the ocean, there is a land very different from the Eskimos' land. This land is called **Africa,** and it is the home of the Negroes, or black people. In Eskimo land, as we have just read, the sun is never very high in the sky; but in this country the people see it at noon right over their heads. Some parts of Africa have a great deal of rain, which makes the plants grow luxuriantly. There are great lakes and rivers, thick forests, and swamps covered with tall grass.

You have noticed how fast the grass and flowers grow in our own country during the warm, moist days of May and June. Now think what would happen if we had such weather all the year, as the people in Central Africa have! Think how the trees, bushes,

grass, and grain would grow! After a time the whole country, if left untouched, would be covered with dense forests and grassy plains.

The Negro's House. The Negro has plenty of materials for building his house. There are tall reeds growing by the river, to make the framework, and there is plenty of long, coarse grass to cover the roof and sides. He cuts the reeds, and sticks them into the ground in the form of a circle or square. The tops are then bent over and fastened together with grass rope, so that the frame of a roof is formed, which is shaped like a huge umbrella. Then, grass is woven in and out among the reeds, until the roof is completed. Sometimes coarse grass cloth is made for covering the roof. An opening is left in the side of the hut for a door, but the Negro does not trouble himself about windows. The dirt floor is pounded until it is smooth and hard, and is then covered with grass, leaves, or with the skins of animals, which serve for beds.

The Negro has Food in Abundance. He does not have to work so hard for a living as the people in cold countries. He may live entirely upon fruits, berries, and roots. Bananas, cocoanuts, bread-fruit, and ground-nuts, are plentiful, and they grow all the year, for there is no winter in the Kongo country. Besides these things, the Negroes raise corn, beans, and other vegetables in the rich soil around their huts. The women pound the corn into meal in a big mortar hollowed out of a block of wood; from the meal they make corn-bread which they bake in a fire kindled outside the hut. (See *Figure 323*).

The Kongo Country. A great river, called the Kongo, flows through this hot country. On account of the heavy rains, it carries down to the sea a huge volume of muddy water. In fact, only one river in the whole world is larger than this one, and that is the Amazon in South America. The forests, plains, and swamps along the Kongo are inhabited by many large and fierce animals.

Tribes and Their Government. The Negroes of the Kongo country live together in tribes. There are perhaps more than a hundred tribes in the Kongo region, living in thousands of villages. Each tribe has

FIGURE 14. A Negro mother and her baby.

a language, which is not easily understood by any other tribe.

The men of the tribe elect one of their number as chief, or king. The chief has much power, and may put any one of his people to death, if he pleases. He is their leader in war, for these tribes often fight one another. They carry off cattle and grain, and sometimes they take prisoners, whom they used to sell as slaves; but this slave trade has now been nearly stopped.

Besides fruits and vegetables, many of the Negroes keep cattle and sheep, and as the country is full of game, there is no lack of meat

for food. The men hunt the smaller game with nets, traps, and bow and arrow. A large band of hunters, armed with long spears, will sometimes form a circle about the fierce lion; they come closer and closer, and when at last the lion tries to break through the circle of hunters, he is pierced with dozens of spears and killed. A common way of catching the elephant or the rhinoceros is to dig a deep pit in the earth, and cover it with branches and leaves. When the animal steps upon this covering, he falls into the pit and is then easily captured.

FIGURE 15. A gorge in a tropical forest of Central Africa, on the south side of Mount Kilimanjaro. A river runs through this gorge, but it is hidden by the forest.

Clothing and Ornaments. The Negroes trade with white men who come to their country, receiving bright colored cloth in exchange for the rubber which they gather from the rubber vines, or for gold which they find in the small streams. Those who do not meet with the white traders, make cloth by weaving together long grasses, or the fibers obtained from the soft inner bark of trees. Out of this cloth the women make petticoats and aprons, and the men tunics, which they wear about the waist. The Negroes do not wear much clothing, but they are very fond of ornaments.

Both men and women bedeck themselves with whatever jewelry they can get. A favorite ornament is the steel fencing wire which they get from the white traders. They wind it about their arms, necks, and legs, until these parts of their bodies are nearly covered with it. Some wear heavy collars and necklaces made from shells or brass beads, and they bore holes through their ears and noses, in which they hang ornaments of almost any kind.

The Pygmies are Little People. There is a tribe of Negroes in the Kongo country, called the Pygmy tribe, whose full-grown men are not more than four feet high, while the women are still shorter. Although the Pygmies are so small they are able to kill large and dangerous animals. They even trap the elephant and the lion. They are crafty and warlike, and use poisoned spears and arrows. Their manner of life is much like that of their larger neighbors.

Some Negroes are Becoming Civilized. The Negroes of the Kongo country are changing rapidly because they meet many

people from Europe. They not only trade with the white men, but they make many

FIGURE 16. Two Negro boys wearing all their ornaments.

things for themselves. Besides grass cloth, they make earthen vessels for holding food, iron heads for their spears and arrows, and hoes, knives, and other tools and utensils for cultivating the fields or for use in their homes. There is such an abundance of everything needed for food, clothing, and shelter, that the Negro's life is easy compared with that of the Eskimo in his barren Northern Land.

SUPPLEMENTARY READING. *Andrews:* "The Little Dark Girl" in Seven Little Sisters, and "A Long Journey" in Each and All. (See also reference list at end of Chapter).

3. LIFE IN A DESERT COUNTRY

Where Rain Seldom Falls. We have read that in the Eskimo country, there is plenty of snow, and that in the Negro country, there is plenty of rain; but in some parts of the world, there are countries where rain and snow are seldom seen. In such a country there can be no grass or trees, and as there are no plants, there can be no animals, except those that can travel long distances without water and food.

These dry regions are called **deserts,** and one may travel in them for hundreds of miles without seeing any green thing. The loose, dry sand is caught up by the wind, and piled into great banks. There are hills and mountains in some deserts, and in places, the ground is covered with rocks and stones. The largest desert in the world is north of the Negro country in Africa. It is called the **Desert of Sahara,** or the Great Desert. Another vast desert region is **Arabia,** in Asia.

Oases are Caused by Springs. In some parts of the desert country there are springs, giving rise to small streams which flow a short distance and then disappear in the sand. Many streams flow down from the mountains into the desert. During the rainy season, they make deep channels many miles in length before their waters are taken up by the dry earth; but for the greater part of the year these water-courses

FIGURE 17. A group of Pygmy warriors armed with bow and arrow and spears. Compare the height of the Pygmies with that of the white man.

are dry. The water from these springs and streams moistens the soil enough to allow flowers, grass, and trees to grow. These green spots in the desert are called oases, and they are the only places where the desert people can have homes. Some of the oases are so large that towns and villages are built on them, but most of them are mere camping places for the wandering people of these dry regions. The most useful tree in the oases is the **date palm,** which furnishes both shelter and food for people and animals.

FIGURE 18. Bedouin tents in the desert region of Western Asia.

The People of the Desert. The people who live in the deserts of Arabia and Sahara, belong mostly to the white race. They are called Arabs, but those who wander from place to place are also called Bedouins, a word which means "Dwellers in the Open." People who lead a wandering life, like the Bedouins, the Eskimos, and the Indians, are sometimes called **nomads.** The Arabs who live in the large oases, build homes of mud bricks and stone, but the Bedouins live in tents made of cloth woven from camels' hair. They keep camels and sheep, and many of them have herds of goats, and fine horses. The dwellers in the villages raise dates, figs, and grain, which they exchange for goods brought from the coast.

Life on the Oasis. The tent of the Bedouin is supported by light poles driven into the sand. The poles in the center are longer than the rest, so that the tent slopes to the ground, where the edges are fastened to pegs driven into the earth. It contains no furniture, but there are always thick mats on which to sit or sleep. (*Figure 18*).

When the Arab has pitched his tent on an oasis, he turns his animals loose to graze; if he can remain a couple of months, he sows some wheat and raises a small crop. When the grass is gone or when the crop is harvested, the tent is taken down, rolled up, and placed with the poles, mats, and cushions, upon the

FIGURE 19. A caravan crossing the Sahara Desert.

backs of the camels, which kneel on the ground to receive their loads. The women and children mount upon their household goods, and the journey to the next oasis begins. The

FIGURE 20. Gathering dates in an oasis.

chief, or head of the family, riding perhaps upon a fine horse, leads the way, and the train of camels, sheep, and goats, follows where he leads. During the heat of the day the train halts for rest, but in the evening and until late in the night, they travel on perhaps a week or more before a place for the next home is found.

The Arabs are Traders. The Arabs call the camel the "ship of the desert." He is their most useful animal and well adapted to traveling over the dry sand. The camel can go for a week with little food and without water. Its broad cushioned feet do not easily sink into the sand, and its strong teeth, long upper lip, and long neck enable it to crop any scanty herbage by the wayside without stopping.

The Arabs often hire out their traders to carry goods across the des trains of camels called **caravans** traveling from oasis to oasis and to town in the desert countries. hair which the camel sheds every y fully saved, for out of it the Arab w clothing for the family. A coarser ki for blankets and tents is woven f hair, and the finest of carpets, rugs are made from the wool of th The Arabs often exchange these t passing caravans for weapons, grain, and other food, and sometimes sell to the traders a sheep, a goat, or a camel. The last thing that an Arab will part with is his horses, for he trains these animals as carefully as his children, and they are noted for th speed, and intelligence.

FIGURE 21. A Bedouin Africa.

Arab Home Life. If you lived in a tent, you may have so the home life of the Arabs. T divided into two rooms by a curtai cloth. One of these rooms is for the other for the women and The **cooking** is done in a copper v over a fire outside the tent. In they cook the flesh of a goat or s cakes made of barley or wheat baked in the hot coals and ash have also plenty of milk, butter, The whole family eat with their f of the same vessel, and after th over, a bowl of water is passed a

washing the hands. Arabia is the earliest home of the **coffee tree,** and the Arabs are especially fond of coffee. Some of the plants which grow in the desert yield gums and incense. The Arabs gather these, and sell them to traders, or burn them in their tents to perfume their clothing.

FIGURE 22. An Arab lady in native costume.

Dress. The Arab wears a loose cotton robe, bound by a belt at the waist, and a turban of white cotton cloth wrapped about his head to protect it from the sun. His feet are shod with sandals made from camel's hide. During the day, the sands of the desert become heated, and the air is hot and stifling. But soon after sunset, the air becomes cool, for the desert sands quickly lose the heat received from the sun during the day. Sometimes the weather becomes almost freezing cold before morning. The Arab provides for this change by carrying a warm cloak made of goats' hair to wear on the march, and he has a blanket to keep him warm when he lies down to sleep.

Women and Children. The women dress like the men, except that their robes are longer and fuller, and they cover their faces with a large thick veil, so that only their eyes can be seen. The children wear little clothing, and amuse themselves by running races and playing about the tent with the animals. As they grow up, the **girls** are taught to cook, to sew, to weave, and to care for the tents. The **boys** learn to ride and shoot. They are taught to repeat passages from the **Koran,** or Mohammedan Bible, to say their prayers five times a day, and to observe other customs of the Mohammedan religion. Country schools are kept in open air; city schools, in the mosques, or churches.

REVIEW. (1) Where could you find a cold country? (2) What name is given to the ocean found in this cold country? (3) Why is there so much snow and ice there? (4) How long are the winters? (5) What can you tell about the icebergs? (6) What effect does the long winter have on plants? (7) Why are there no trees or shrubs in the cold country? (8) Name some of the animals found there. (9) Compare the food and clothing of the Eskimos with ours. (10) How does the Eskimo obtain his food and clothing? (11) Describe his home. (12) How is the hut of the Eskimo warmed and lighted? (13) Tell a story about an Eskimo hunting party. (14) Where is the home of the black race? (15) Compare the weather in Africa with that in the Eskimo country. (16) What can you tell about the appearance of the sun in these countries? About the rain and the plants? (17) Name some of the animals found in the Kongo country. (18) What is the ruler of a Negro tribe called? (19) What power does he have? (20) How does the Negro build his house? (21) What food does he eat? (22) Tell something about his hunting. (23) What kind of clothing does he wear? (24) Why does he need so little? (25) Tell something about the Pygmies. (26) What is meant by a desert? (27) What is an oasis? (28) Why do the people of the desert lead a wandering life? (29) Why do they live in tents? (30) What animals do they keep? (31) Describe the journey of an Arab family from one oasis to another. (32) How are the camel, sheep, goat, and horse useful to the Arabs? (33) Tell something about the food of the Arabs; the clothing.

OBSERVATION WORK. (1) Have you ever seen an Eskimo or an Indian? If you have, tell about their color, hair, and eyes. To what race do you think they belong? (2) How do plants change with the coming of winter? (3) How does a snowball change when you pack it very hard in your hands? (4) Can you think how snow might be changed into ice? (5) Have you seen any of the animals that live in a cold country? (6) What changes do we make in our clothing and homes when the cold weather comes? (7) Would you like to live in a country where the weather is always warm? Tell why you would like to live there. Tell why you would not like to live where it is always cold. (8) Do you know of any people besides the Arabs who live in tents? If so, can you tell why they live in this manner? (9) What kind of climate is best suited to tent life? Why? (10) If you have lived in a tent, write a story about tent life. (11) Can you think of anything that we might buy from

the Eskimos for our own use? From the Negroes? From the Arabs?

SUPPLEMENTARY READING. *Andrews:* Each and All. *Starr:* Strange Peoples, pp. 6–12. *Horton:* The Frozen North. *Schwartz:* Five Little Strangers. *Andrews:* Seven Little Sisters. *Carroll:* Around the World, Book Four, pp. 122–138. *Shaw:* People of Other Lands. *Morris:* Home Life in All Lands, Books One and Two. *Lyde:* Man and his Markets. *Chamberlain:* The Oasis and its People, pp. 189–195. *Lyde:* Man and his Work, pp. 1–42. *Fairbanks:* Western United States, pp. 187–204. *Ballou:* Footprints of Travel. *Youth's Companion Series:* Northern Europe, Strange Lands near Home, The Wide World, Toward the Rising Sun, and Under Sunny Skies. *Dutton:* In Field and Pasture.

III. SOIL

All Plants Grow from the Soil. The loose earth that we find everywhere in the fields and gardens is called soil. Sometimes we call it dirt, especially when it is in some place where it does not belong. The farmer and the gardener plow and dig up the soil, and sow seeds and set out trees. Grass and weeds grow out of the soil, and we find something growing wherever there is soil, with enough water to moisten it and enough sunshine to keep it warm. On page 5 of this book we learned that nearly everything that we use for clothing, food, and shelter, comes from the soil.

What we Find by Digging in the Soil. Perhaps you like to dig in the earth. Take a spade or a garden trowel and dig a hole in the field or by the side of the road. After you have taken up the sod, you will find a layer of soil. Perhaps it is brown or reddish in color. Take some of it and rub it between your fingers. You find it mixed with sand and stones of different sizes. This layer of dark soil may be only a few inches deep,

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HOW TO STUDY. Nothing is more wonderful than the soil. It is plain and ugly in the early spring; but when it puts on its robes of green grass and flowers, how beautiful it becomes! Soil is a *dead* thing; but with the help of the sun and the rain, life springs up out of it. To learn the lessons taught in this chapter so that you will not forget them, you must find out for yourselves that the things told in it are true; and you can do this by following the directions that you find at the beginning of the first lesson. You must not only study the soil, by observing the things described in the lesson, but you must try to find out why those things are so. What Madam Thoughtful will not tell you, you must ask your teacher or some one else who is older and wiser than yourself. You will see many things that are not told in the lesson; you may notice that in some places where there is soil, there are no plants to be found. And you may wonder why they do not grow in such places; or you may find soil that is very different from any kind of soil mentioned in this lesson. Remember that when you see new and strange things you are to become an *investigator*, or in other words, "one who finds things out."

Below the dark layer of soil you may find a reddish-brown earth which is tough and

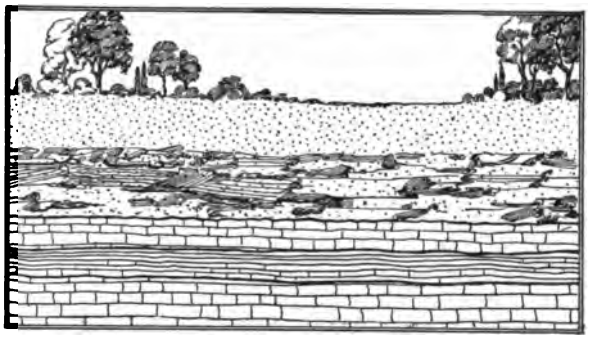

FIGURE 23. This drawing shows what we usually find when we dig into the earth. At the top we find soil with grass and trees growing out of it. Below the soil we find partly decayed rock. Next we come to solid rock in layers.

hard to dig; this substance is called clay. When mixed with water, clay becomes sticky like putty, and you can roll it into a ball; if, then, you should put it into the stove-oven and bake it, it would become hard. Instead of clay you might find beneath the soil in some places, a layer of sand, or of hard rock.

but in some places it may have a depth of many feet. The soil is much deeper in the valleys along the brooks and streams, than it is far up on the sides of hills.

FIGURE 24. Thick layers of clay beneath the soil. This clay is used for making bricks.

What Soil is Composed of. Put a handful of soil into a basin. Pick out the small stones and pebbles and lay them aside. Perhaps you will find pieces of grass stems, and bits of leaves partly decayed. Take these out also until you have only the finer part of the soil left. Now, pour water into the basin and stir up the soil and water until it is muddy. Pour off the muddy water into a glass. Put in more water until you have washed out all the mud.

You will now have left in the basin a substance composed of tiny, hard grains of different sizes. Roll some of this sand between your fingers or look at it with a magnifying glass, and you will learn that the grains have sharp edges and corners. Rub some of them over a piece of glass and you find that many are hard enough to make scratches on it.

FIGURE 25. Eroded rocks along the Grand Canyon of the Colorado River. All the softer parts have been worn away to make soil, which has been carried to the mouth of the river, where a delta has been formed. This gorge is about a mile in depth.

Let us now look into the glass. The water has become quite clear, and on the bottom we find a layer of soft mud. By and by we shall learn what this mud is made of. So far, we have found that our handful of soil contains small pebbles, or gravel, sand, bits of leaves and grasses, and mud.

How the Soil is Made. Soil is formed partly by the decay of rocks, caused by the rain, the air, the frost, and by

growing plants and running water. The rain soaks into the rocks and softens them, so that after a time they fall to pieces. If you examine the top of a rock or the side of an old stone wall, you will find that the outside can be easily scraped off, especially if the rock and the stones are made of sand or other material which easily falls to pieces. Some rocks are harder than others and decay very slowly.

At the foot of a rocky hill or cliff, there is often to be seen a sloping pile of fragments which have crumbled and fallen away from the sides of the rock. This decay of the exposed rocks is caused by moisture and by a gas in the air, called **oxygen.** If iron, tin, or other metals are left outdoors, or in any damp place, they rust, and after a time they will fall to pieces. The iron becomes reddish and you may rub off a reddish powder from its surface. The decay of metals also is caused by oxygen and moisture. Some metals decay more slowly than others; gold and platinum do not decay at all.

Water, Plants, and Earthworms Help Make Soil. Water helps to break up rocks by freezing in their crevices. The ice takes up more room than the water and splits off pieces of rock. You may have noticed how a pitcher is sometimes broken if water freezes in it. Sudden heating and cooling will also chip off little pieces from the surface of the rocks. This kind of decay takes place quite rapidly in desert regions where the earth becomes very hot during the day and very cool at night.

The Indians used to chip their **arrowheads** from pieces of flint by first heating the flint in a fire and then dropping water on the place which they wished to chip off. In this way they gradually brought the flint to a sharp point.

Plants also take part in breaking up rocks. Their tiny rootlets make their way into crevices which are partly filled with soil, and as these rootlets grow larger they force the

FIGURE 26. The upper course of a broo hills. The swift water wears the stones sand and soil.

rocks apart, or break off little pi the crevices. Plants help to ma another and more important wa fall to the ground and decay; and grasses die, and their remains to the soil. In the forests, we trunks of trees, stumps, and branc are partly rotted. All dead plan a time, becomes a part of the soil animals that die, also become a p

Earthworms help to make soil l it up in their bodies; they leave i powdery mass which you may see hole where the worm has burrow earth.

Soil is Formed Only at th Soil can be formed only where th air, and the frost can act upon and this takes place at or near t of the ground. The water that the soil helps to soften and bre

rock which is below it, especially if the rock is soft. So it happens that the soil is being deepened not only by broken rock, leaves, and other matter from the outside, but also by the soft rock which is decaying underneath.

Water Carries Soil from Place to Place. If you have watched a swift-flowing brook, you can understand how some soil is made, and carried from place to place. As the small stones and pebbles are rolled along by the stream, they are rubbed together, and tiny particles are worn off. Part of the sand and mud thus formed is deposited along the banks, and part is carried down to the larger stream into which the brook flows.

Let us notice also what takes place on a steep hillside during a heavy rain. The water gathers in little rills and streams, and flows down the hill into the brooks below. The water is muddy. It is made so by the fine soil which it has brought down from the hillside; and the hill itself is left furrowed with little channels. The mud is carried down into streams, which often overflow their banks, forming lakes of muddy water in the low places. After a time this water runs off or soaks into the ground, leaving a layer of mud on the sod. Thus the water takes away soil from the hills and mountains and spreads it out over the lowlands, or carries it away to lakes, or the ocean, into which all running waters finally flow. So it happens that the soil on the hills is much thinner than it is in the lowlands.

How the Different Kinds of Soil are Named. Soil is composed of many different materials, but we give it a name from the material which is most abundant. Soil that is mostly sand, such as we find in lands near the ocean, we call **sandy soil.** If the soil contains coarse pebbles we call it gravel. When

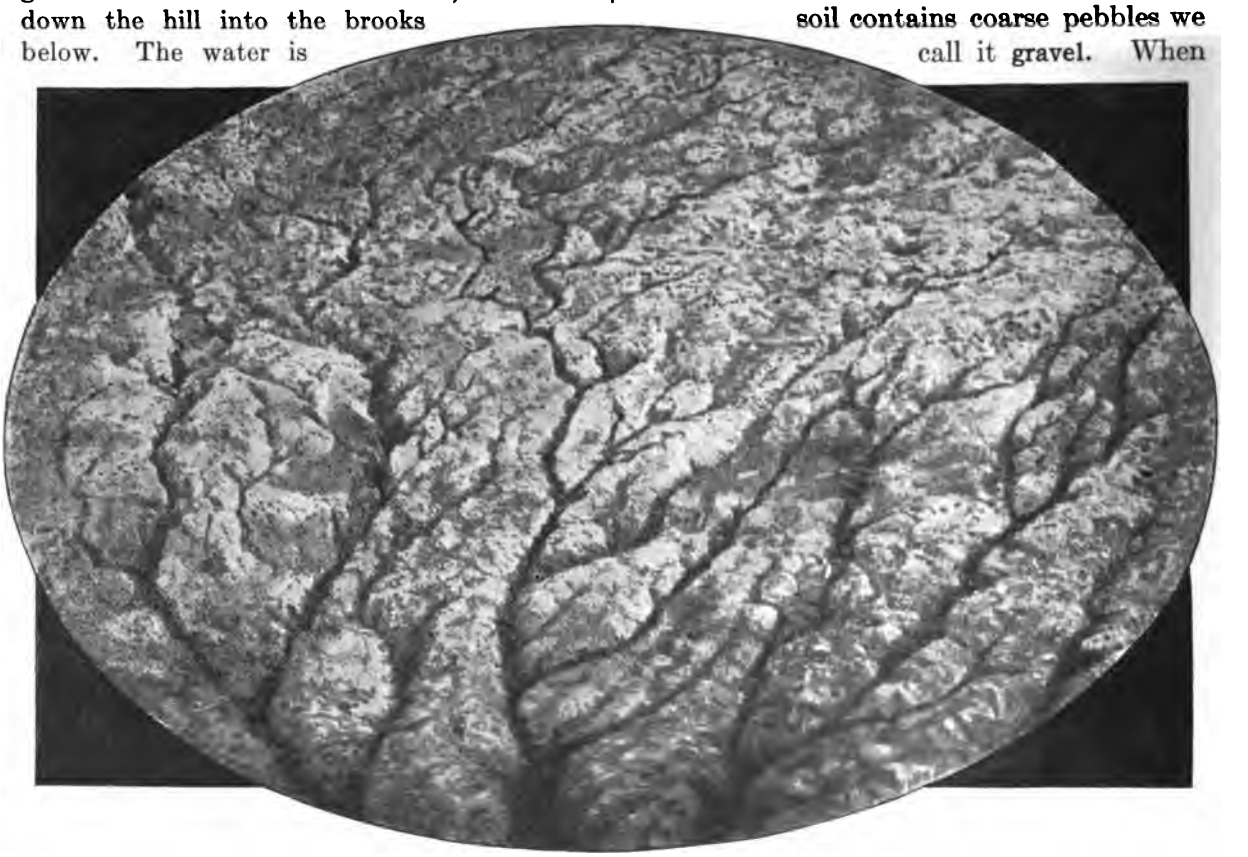

FIGURE 27. Effect of rain on a hillside. Notice how the channels join and grow deeper.

either sand or gravel contains a large amount of decayed animal matter or vegetable matter we call the soil **loam.** In this way we speak of a sandy loam or a gravelly loam. In the same manner, we have clay soil, limestone soil, and other varieties according to the rock which has decayed to make it.

Soil is the Food of Plants. If the soil is rich in plant food we call it **fertile,** but if it contains little or none, it is **sterile.** Perhaps you have never thought that plants need food to make them grow, just as you need food to make you grow and to keep you well and strong. Plants get part of their food from the soil, and part of it from the air. They take food from the soil by means of their roots. If you pull up a plant of any kind, you will notice that it has a mass of thread-like roots, which burrow into the soil in every direction. These roots take up the water in which the plant food is dissolved; for plants can take nourishment only in the form of a liquid.

The commonest kinds of plant food are **minerals,** which contain salt, lime, iron, phosphate, and other substances. These minerals will dissolve in water just as a lump of sugar dissolves in tea or coffee. After this plant food has been taken up by the roots, it is carried into the wood, bark, and leaves of the plants and trees and makes them grow, just as the bread, meat, and milk which we eat make the different parts of our bodies grow.

Not all plants require the same kind of food; or perhaps it is better to say that some plants require more of certain kinds of food than others do. Soil which will raise rye, barley, or buckwheat, may not be good for wheat and

FIGURE 28. Lower course of a brook in the valley.

corn. Peach trees will grow in a sandy soil, but apple trees require a deep loam. It is the business of the farmer to find out which is the best soil for each of his crops.

How the Soil May be Kept Fertile. Every crop that the farmer raises, takes some plant food out of the soil; and if he does not add something to it to keep up the supply of plant food, the soil will soon become sterile. He can keep the soil fertile by allowing crops such as grasses, to decay upon the land. He may also spread upon his fields the waste material which gathers in the farm yards, or he may draw the black mud out of the swamps and spread it over them. By deep plowing, much fertile soil which lies below the surface may be brought up. Besides these methods, he may use **fertilizers,** which are made from animal and mineral matter. Thus by proper management, sterile soil may be made fertile, and fertile soil improved.

REVIEW. (1) What is soil? Where is soil found? What do we get from the soil? (2) What do we find beneath the soil? (3) Of what materials is soil made? (4) How does the rain help to make soil? How does water help make it? How do ice and the air help? How do heating and cooling affect rocks? How do growing plants affect them? What is said of the work of earthworms? (5) What does soil contain besides decayed rock? (6) Tell how running water helps to make soil and to carry it from place to place. (7) Why is soil deeper in some places than in others? (8) Name some of the different kinds of soil. (9) What is meant by fertile soil? By sterile soil? (10) Name some of the different kinds of plant food found in the soil. (11) In what way do plants take food from the soil? (12) In what ways may the soil be kept fertile?

OBSERVATION WORK. (1) Examine the surface of a rock which has been exposed to the weather for a long time, as the stones in an old wall; compare with the surface of a freshly broken stone. What difference do you notice? (2) Heat a piece of sandstone and then drop it into cold water. What happens? Notice the color of the soil near your home. Put a handful of it in a can of water, shake it up and pour off the muddy water. Examine what is left and tell of what it is composed. (3) Notice the depth of the soil where a cut has been made for a railroad or in an excavation for a cellar or on the side of a bluff by a stream. Notice also how the color of the earth changes at different depths. (4) Notice what happens when tools are exposed to the weather; observe the effect on wood and on metals. Why should tools always be kept in a dry place? (5) Notice the effect of running water on the soil. In what direction is it carried? How would this affect the depth of the soil on hills? On lowlands? (6) Notice what changes take place in potted plants when they are not watered. Why is it necessary to water them? (7) If you live in the country observe in what kind of soil each of the different crops is raised. Observe also what the farmer does to keep the soil fertile. (8) Why must the farmer plow and dig up the soil and keep it loose around the trees and plants that he raises? (9) Why are iron fences kept painted? Notice some that have not been painted in a long time. (10) What happens to houses and boats that are not kept painted? (11) Where would you obtain soil to fill your boxes and flower pots if you were going to have a window garden?

SUPPLEMENTARY READING. *Frye:* Brooks and Brook Basins, Chapter VI. *Fairbanks:* Home Geography, pp. 15–28. *Dodge:* A Reader in Physical Geography, pp. 69–100, 198–205. *Shaler:* The Story of Our Continent, pp. 5–7, 184–188. *King:* The Soil. *Kingsley:* Madam How and Lady Why, Chapter IV. *Spencer:* The World's Minerals.

IV. THE RAIN AND THE AIR

Where the Rain Comes From. We know that rain comes from the clouds. Almost every day clouds may be seen floating in the air above us. Some of these clouds are white and fleecy, and look like curls of thin smoke; they are high in the air and are always changing in form. Some clouds are gray, and lie in long lines near the horizon.

Other clouds hover near the earth in

HOW TO STUDY. When you study this lesson and the two following lessons on "Weather and Climate," and "The Sun and the Seasons," you must be careful to answer the questions and do the experiments called for in the OBSERVATION WORK at the end of each lesson. Not all of us may be able to visit a mountain, a lake, or a river, but we live in the atmosphere, and the rain falls everywhere. We are obliged to notice changes in

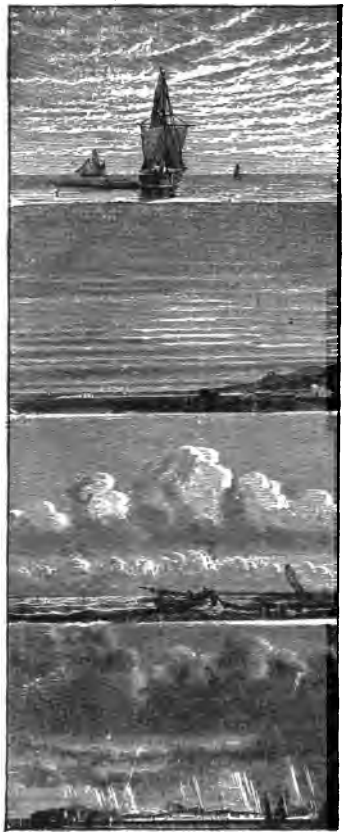

FIGURE 29. Four kinds of clouds: 1. Cirrus, or *curl* clouds. 2. Stratus, or *layer* clouds. 3. Cumulus, or *mass* clouds. 4. Nimbus, or *rain* clouds.

heavy, dark masses. Such clouds may be seen just before a thunder storm in summer; but when driven on by the wind, they spread out into gray masses which we call rain clouds. In fair weather the clouds are high above the earth, but in wet weather they are close to the ground, sometimes touching it.

How Clouds are Formed. But what are clouds made of? To find an answer to this question, let us watch the **vapor** which comes out of a boiling tea kettle, or out of a steam engine. If the kettle boils long enough, all the water will come out of th the form of steam; and the water in of the steam engine would "boil more water were not added every

Look closely at the spout of t kettle. Nothing can be seen at th of it, but a little way from the en see the white vapor which forms the steam strikes the cool air. itself is invisible, but as soon as little it becomes visible vapor.

Evaporation and Condensa can now understand that when heated, it is changed into va change we call evaporation. W see that cold changes vapor back and this change we call condens

More than three-fourths of the the earth consists of the oceans bodies of water; there is also mois soil and in all kinds of plants. The the sun is always turning some of into vapor, which cannot be seen, light that it rises into the air; but it cools and becomes visible. made of *visible* vapor; but there moisture in the air which we cann which we call *invisible* vapor. E this invisible vapor may become v may be changed into water drops.

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the weather and in the seasons, and most of us know that these changes are brought about by the sun and the winds. We must, therefore, be careful to observe just what changes in the wind and what changes in the position of the sun cause the changes in the weather and the seasons. It is for this reason that it is important to keep a record like the one shown on page 27. If this record is kept *long* enough, we shall be sure to notice that the length of day has something to do with temperature, and that the wind has something to do with the condition of the sky, and with rain and snow. Each of you should read two or more of the references given under SUPPLEMENTARY READING at the end of each chapter, and you should be able to tell in your own way what you have read. that everything that men know and that books contain, about the rain, the air, the sun, the seasons, the cl the weather, have been learned careful observations and keeping rec

Hold a piece of glass or some object in the vapor, and soon li of water will gather on the glass, down over the cold surface. When "blows off steam" on a cold day, will fall in a little shower of fine w The vapor from the kitchen gather windows when the weather is cold, times turns to frost. In such w moisture in one's breath may b vapor.

How Clouds are Condensed to Rain. The air near the earth is much warmer than it is high above the surface. If we should climb to the top of a hill we should find the air cooler at the top than it is at the base; and if we should climb a mountain we should find the air very cold. The higher we go into the air the colder it becomes.

When the water vapor rises from the earth, it meets the cooler air and turns into clouds; and if the air is cold enough, the clouds condense into rain.

How Springs are Formed. When rain falls upon the earth, some of it runs off in little rivulets to the brooks and streams, but the greater part of it soaks down into the soil and disappears. It keeps sinking until it comes to a layer of hard rock or clay, which will not allow it to go any deeper. Little streams are thus formed under ground.

These little underground streams flow on and on beneath the soil until they come to some hillside or valley, where they come to the surface forming springs. A spring is an underground stream of water which has found its way to the surface.

To obtain water for the house and for their animals, farmers often dig holes into the ground until they strike an underground stream. These holes, when walled up with stone, we call **wells.** Such streams may be found almost everywhere in the earth if the well is dug deep enough. When there is plenty of rain, the underground streams which feed wells, are kept full; but in times of drouth, they often dry up, and then, of course, there is no water in the well.

Air is One of the Necessaries of Life. Without air to breathe, all the animals would die at once, and in a short time the plants would die too. Without air, no fires could be made and no lamps could be lighted, for it is the **oxygen** of the air that makes things burn.

FIGURE 30. Illustration of evaporation and condensation. Point out where each process is taking place.

The body of air which rests upon the earth and surrounds it like a great hollow globe, is called the **atmosphere;** but air is found in the soil, in wells and mines, and its oxygen is taken up by the water, and keeps alive all the creatures that live in the rivers, lakes, and oceans.

Air Cannot be Seen. We can feel the air when we breathe it or when it strikes against our bodies, but we cannot see it. We can see that it is in motion when it

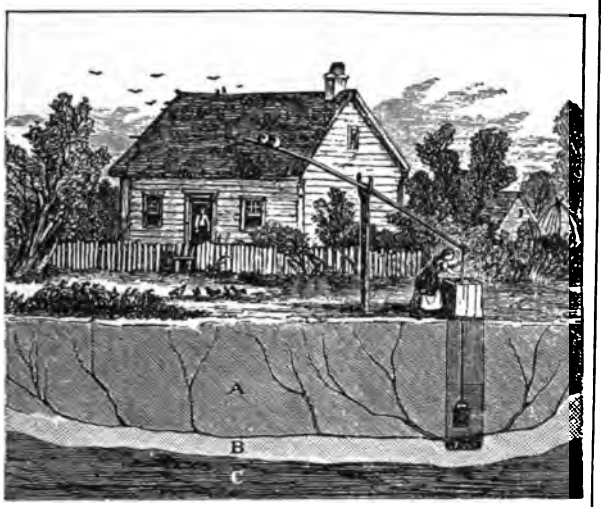

FIGURE 31. Section of the earth showing how a well is supplied with water by underground streams. A and B are soil and porous rock. C is a layer of hard rock which holds the water.

moves the trees, and rattles the doors and windows of our houses. When air is in rapid motion it is called **wind,** but when it moves more slowly we speak of it as a current, or draft. Air is never entirely at rest, as you can see by blowing a little smoke into a room. The smoke is moved about the room until, perhaps, it is caught by an air current and carried out of the door or window.

What the Winds do for Us. In the form of wind, the atmosphere is useful to us in many ways. It drives the wheels of windmills and blows ships across the ocean; and what is of greater importance, it carries water vapor to keep the earth supplied with rain. The greater part of the water vapor is formed over the ocean, and as it rises into the air, it is caught by the wind and carried over the land for hundreds and thousands of miles, to water the farms and gardens, and keep the brooks and rivers full.

Besides these things, the cool winds temper the heat of summer days and nights. They blow from over the sea or down from the mountain tops, filling our homes with refreshing coolness. When the air is hot and stifling in our large cities, many people can go to the seashore or to the mountains, and live comfortably during the hot weather.

How Air is Kept in Motion. We can learn something about the cause of the winds by studying a lighted lamp, or a heated stove or radiator. Put your hand above the lamp and you will feel a current of heated air rising from the chimney. Look closely at the hot stove pipe or radiator: you may see little *waves* of heated air along the hot surface. Hold a light handkerchief above the radiator and it will be lifted up by the strong current. We may learn from these experiments that when air is heated, it rises, forming an upward current, but when air is cooled, it sinks. We may show this also by opening the window a little at the bottom. The cold air flows in and spreads out over the floor. If you should hold your handkerchief near the bottom of the radiator it would be drawn toward it, showing that the cold air flows along the floor toward the radiator. The air at the top of a room is always warmer than at the bottom. This is one reason why puss sometimes climbs up on the mantel or on the top of furniture; she likes the warmer air.

Ventilation. It is very necessary to have pure air in our homes and schools, and in any building where many people are together. This is done by keeping the air in motion, so that the foul air is carried out and the pure air carried in. Good ventilation may usually be secured by opening the windows of a room both at the top and bottom; in this way two currents of air will be established, one flowing in and the other flowing out. If a board perforated with holes is placed beneath the window,

the air will flow *out* through some of the holes and *in* through others; in this way the air will be kept pure.

The Movement of the Air on the Earth. The movement of the air on the earth resembles that of the air in the room. Some parts of the earth are always heated more than other

FIGURE 32. The movement of air in a schoolroom caused by a radiator.

parts. In the heated regions, the air is rising, while the air from the cooler regions flows in beneath and helps to make it rise. The heated air is really crowded upward by the heavier cold air which takes its place. Something like this happens when you pour water into a glass half filled with oil; the heavier water pushes the lighter oil upward.

Land and Sea Breezes. Everywhere on the earth cold air is flowing *toward* the heated regions, and warm air is flowing *back* toward the cooler regions. Do you know why people go to the seashore in the afternoon to get the sea breeze, or why sailing vessels leave port very early in the morning? During the day the land becomes much warmer than the water, and so in the afternoon and evening the breeze comes from the cooler sea. During the night the land becomes cooler than the water; then towards morning the breeze is blowing from the land toward the sea, and this land breeze helps sailing vessels to get out of the harbors.

What Air is Made of. Besides oxygen, the air contains nitrogen and water vapor; it contains also carbonic acid gas and a few other gases in small amounts. We have learned partly what oxygen does for us and for animals. The carbonic acid gas helps the growth of plants. The plants breathe it in through their leaves and use it to build up their stems, branches, flowers, and other parts.

Plants and animals are useful to each other in this way: the plants give out oxygen and moisture, which are useful to animal life, and animals breathe out carbonic acid gas, which helps to support the plants. The nitrogen in the air has no important use other than to dilute the oxygen making it suitable for us to breathe.

REVIEW. (1) Where does the rain come from? (2) How are clouds made? (3) What did you see when the kettle boiled? (4) What became of the water in the kettle? (5) What is meant by evaporation and how is it caused? (6) What is condensation and what causes it? (7) Where does most of the cloud vapor come from? (8) Trace the rain from its fall upon earth until it reaches the ocean. (9) How are underground streams formed and for what are they useful? (10) How can you show that air contains vapor although you can not see it? (11) Why does cold make vapor visible? (12) What is the atmosphere? (13) In what places is air found? (14) Of what gases is air composed? (15) Which of these gases is most useful? (16) How is air set in motion? How are the winds useful to us? (17) Why does heated air rise? (18) Why does the air blow from the sea toward the land in the afternoon? (19) At what time of the day do you think it blows from the land toward the sea? (20) How do plants and animals help each other?

OBSERVATION WORK. (1) Notice the different kinds of clouds; the light fleecy ones high in the air, the dark heavy ones near the earth, the massive clouds that look like mountains, and the clouds that lie in long lines. (2) In what part of the sky do you see each kind? (3) Study the process of evaporation by boiling water, and by observing the formation of moisture on the outside of an ice-pitcher. (4) Notice the steam coming from the stack of a locomotive or from a factory engine. What happens to it on a cold day in winter? (5) Put some water and pieces of ice into a bright tin cup, and stir the mixture. In a few minutes you will notice that the outside of the cup becomes moist soon with tiny water drops, covering the outer surface of the cup. What has happened? The invisible vapor of the air has become condensed on the cold tin cup. (6) Pour a pail of water upon the grass or upon loose soil; try the same experiment on the road or on the hard earth of the ball ground. What difference do you notice? (7) Notice the location

of a stream in your neighborhood. Observe the width of the valley and the slope of the hills on each side of the stream. (8) If you know where to find a spring, observe its location and the direction from which the water appears to come. (9) If you know where there is a well, find out how deep it is. Where do you think the water in it has come from? (10) Notice how quickly the earth dries after a rain in summer; also that on some days the dew stays on the grass until late in the morning, while on other days it dries quickly. How do you explain the difference? (11) On what kind of days do wet clothes dry quickly? Notice that warm, dry air takes up moisture easily. When the air becomes so damp that it will not hold any more moisture, rain is likely to fall. (12) How do you feel if the wind blows upon you when your clothing is wet? The moisture in your clothing evaporates and takes some of the heat out of your body. Wet your hand and blow upon it. How does your hand feel? (13) Close the draft of a stove or shut off the supply of air from a lamp. What do you observe? (14) smoking paper near the bottom of the la where does the smoke go? What carries it ney? (15) Hold a light handkerchief or a s over a register, a radiator, or near a hot s happens? (16) Why does a pin wheel fas stove pipe sometimes go rapidly while at o does not go at all? (17) Why do you open the stove when more heat is desired?

SUPPLEMENTARY READING. *Frye* Brook Basins, Chapter VIII. *Murché:* Scie Book III, Lessons 10, 13, 18, 26. *Payne:* Nature Studies. Cornell Nature Study Bu *Andrews:* Stories Mother Nature Told h *Wilson:* Nature Study in Elementary S II, "Myths, Stories and Poems." *Long:* H phy. *King:* Geographical Readers, Firs 103–116. *Fairbanks:* Home Geography Grades, pp. 39–58.

V. WEATHER AND CLIMATE

The State of the Air is Always Changing. The amount of water vapor in the air

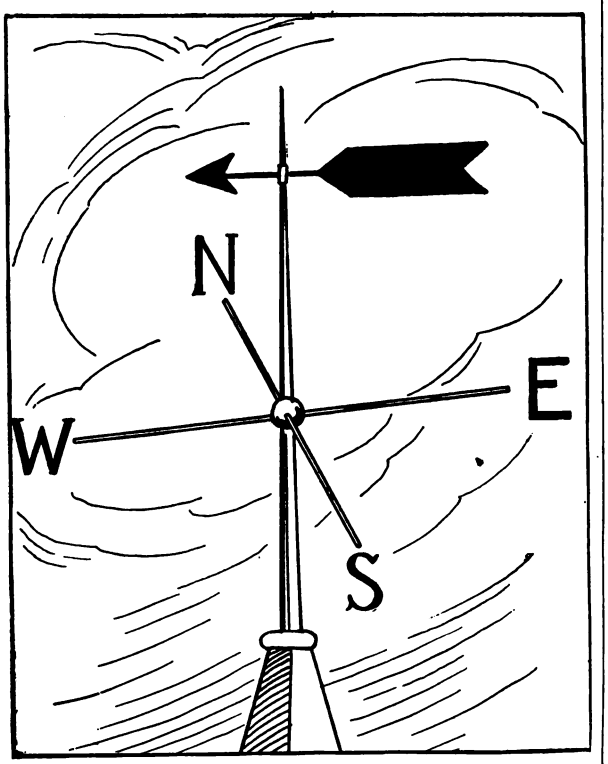

FIGURE 33. A weather-vane.

varies from day to day. The temperature of the air also varies, because the earth receives from the sun less heat in winter than in summer, and less on cloudy day clear days. The direction of the w changes, and this also brings abou in temperature. On some days rain or snow, and on other days clear. The condition of the air a time in regard to heat, moisture, ence of clouds, the direction of t and the amount of rain or snow we call **weather.**

Climate. By observing the wea day for a number of years, it has l that during each year we have abou amount of rain and snow, and abou number of clear days. The wind, through the same changes each average condition of the weather f year, or part of a year, we call **clim**

Observation of the Weathe be useful to make for ourselves servations of the weather. Let these observations on a sheet ruled like this:

Date	Length of day	Temperature	Direction of wind	Character of wind	Sky
Sept. 21	12 hours	70°	South	Strong	Cloudy
" 22	12 hours	65°	Southeast	Gentle	Clear
" 23	12 hours	54°	East	Moderate	Cloudy

This record should be filled out at the same hour each morning. The length of the day may be found in an almanac. To find the temperature of the air, a thermometer is

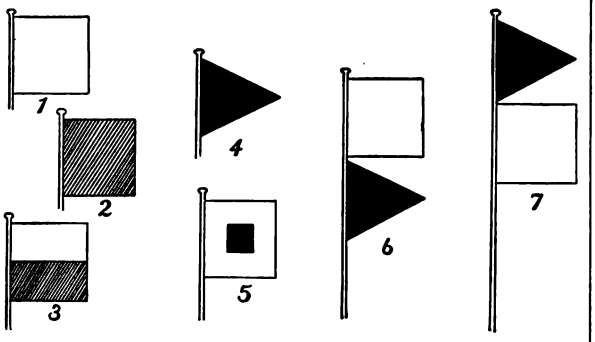

FIGURE 34. Signal flags used in forecasting the weather: A square *white* flag (1) indicates clear or fair weather. A square *blue* flag (2) indicates rain or snow. A square *blue* and *white* flag (3) indicates local rains or showers. A triangular *black* flag (4) always refers to temperature: when placed below 1, 2, or 3, as shown in 6, it indicates colder weather; when placed above, warmer weather. A square *white* flag with a *black* square in the center (5) is generally displayed twenty-four hours in advance of a cold wave.

needed. Nearly every schoolroom contains a thermometer. Study its parts and learn to read it. For finding the temperature outdoors, the thermometer should be hung outside of the window where it can be read through the window without being taken down.

How to Tell Direction. A weather-vane at the top of a high pole or building will show the direction of the wind. Weather-vanes generally have marked upon them: N, S, E, and W, so placed as to indicate the North, the South, the East, and the West; an arrow or a pointer above the letters is so made that it will *point to the direction from which the wind is coming*. The winds are named according to the direction from which they blow. If there is no weather-vane in sight, the direction of the wind may be learned by noticing the course taken by the smoke from some chimney, or the ripples on a pond, or even by the sense of feeling.

Signal stations are places where the weather is regularly observed. These stations are furnished with instruments for telling not only the temperature and the direction of the wind, but also for measuring the speed of the wind, the amount of moisture, the weight, or pressure, of the air, and the depth of rain or snow that falls.

Usefulness of Weather Observations. There are signal stations in many places in the United States and other countries. Every morning the observations made at each station are reported by telegraph to certain central stations. By studying these reports it is possible to predict what the weather will be for a day or more in advance. This information is published in the newspapers and posted in public places. It is of great value to farmers, as it enables them to protect the crops from the dangers of rain or frost. It is useful also to sailors and travelers, because it enables them to prepare for storms or changes of temperature.

Different Kinds of Climate. In places where the average temperature for the year is about 60°, the climate is called **temperate.** When the average temperature is about 30°, the climate is said to be **cold.** If the average is 80° or above, we call the climate warm, or **tropical.**

How Rainfall is Measured. The depth of the rainfall or snowfall is measured in inches. If all the rain and snow that falls in one place during one year would cover the ground with water 40 inches deep, we say that the rainfall is **moderate.** A rainfall of 60 or more inches is called **heavy,** but if less than 20 inches, we call it **light.** Places which have less than 10 inches of rainfall in a year, have few plants and are generally deserts. In most regions of the United States the climate is temperate and the rainfall moderate.

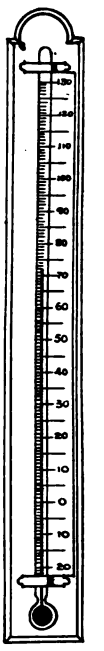

FIG. 35. A thermometer.

REVIEW. (1) How do you explain changes in the amount of vapor in the air? (2) How does the wind affect temperature? (3) What is meant by weather? (4) What is meant by climate? Explain the words, "cold," "temperate," and "tropical." (5) Explain the use of the thermometer. (6) How can you tell the direction of the wind? (7) Which winds bring rain where you live? (8) Which winds bring cold weather? (9) What is a signal station? (10) Where is the one nearest to your home? (11) Tell some uses of weather observations. (12) What is meant by heavy rainfall, moderate rainfall, and light rainfall?

OBSERVATION WORK. (1) What are some of the signs of approaching rain? (2) Notice the direction of the wind, the appearance of the clouds, the actions of animals, the distinctness of sounds, and the appearance of the sun and the moon before a rain. (3) A barometer helps determine what the weather will be. If you have one at your home or at your school, ask some person to teach you how to read it and what the reading means. (4) Ask some one who has rheumatism or neuralgia how he is affected by an approaching storm. (5) What provision can farmers make against rain? (6) Hang a thermometer where the sun shines upon it at compare the temperature with that observed ir place at the same time. (7) Why do you pref the shade on a hot day in summer? Why is i the shade? (8) Watch the smoke from a before a rain. Does it move the same as at ano Give some reasons why smoke sometimes com the ground, or why it rises into the air. D weather have anything to do with the way (9) How can you tell when there is much m the air? Notice the change in your clothir varnished or sticky surfaces. Why do the drawers stick? (10) How does damp weather ing and harvesting?

SUPPLEMENTARY READING. *Pay* graphical Nature Studies. *Parker and Hel* Robert's Geography, Chapters, 3, 6, 7, 1(A Reader in Physical Geography, pp. 171–1 *banks:* Western United States, pp. 205–214, *Wilson:* Nature Study in Elementary School Reader. *King:* The Picturesque Geographica Third Book, pp. 142–153. *Harrington:* A Weather.

VI. THE SUN AND THE SEASONS*

Vertical Rays Give More Heat than Slanting Rays. If we observe the thermometer at different times during the day we shall find that usually the mercury is lowest early in the morning, that it rises steadily until about two o'clock in the afternoon, and then begins to fall. We learn from this that the sun warms the earth at any place less at sunrise and sunset than at ar time during the day. At noon in s the rays of the sun are nearly v but at other times they fall in a direction, and on this account th the earth less heat.

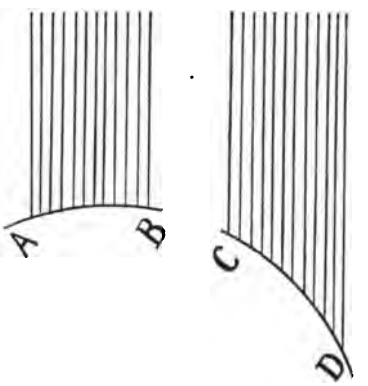

FIGURE 36. The rays A B strike the earth vertically, the rays C D strike in a slanting direction. As DC is longer than AB, the same number of rays are spread over a greater surface and give less heat.

Perhaps you will ask why the mercur highest at two o'clock when the rays sla than they do at noon. During the pa day when the sun is nearly overhead, t is receiving heat faster than it gives Hence, it *stores up* the extra amount it But after two o'clock, or thereabouts, i to give out heat faster than it is rece that the air grows cooler and the begins to fall.

The Sun Appears to Move Nor South. Every day the sun appears t through the sky from east to west; has another **apparent** motion which is easily seen. To discover this moti must observe the sun at intervals for months. When you begin school

*If thought advisable, the more difficult parts of this chapter may be taken up in connection with Chap

tember, notice from which direction the sunlight enters the schoolroom window at nine o'clock. If it shines straight through the window, you will know that the window faces the east. If it shines straight in the window at sunset, you will know that the window faces west.

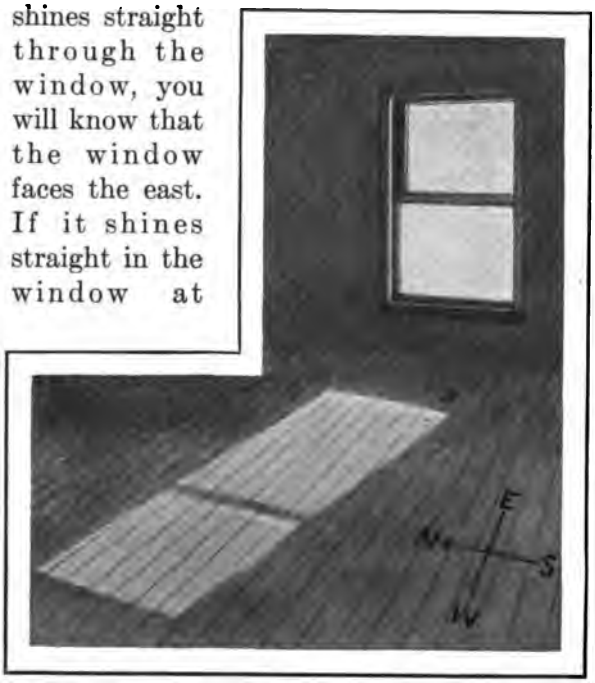

FIGURE 37. Sunlight in winter.

Make a chalk mark on the schoolroom floor at the farthest point reached by the sunlight at nine o'clock. Mark the end of the ray on the first day of each week, for several months, and you will notice that the ray reaches farther and farther into the room until about the twenty-first of December. You will also notice the sun must be lower in the sky at each observation, to enable its rays to shine farther into the room.

Where the Sun Rises. Now let us study the direction of the sun's rays. We say that the "sun rises in the east"; but this is only *exactly* true on September 22 and on March 20 of each year. On these dates the sun is directly overhead at the Equator, and the shadows fall toward the west at sunrise, and toward the east at sunset. If we draw a chalk line along the floor in the direction of the sunlight, about September 22, this line will point east and west. If we draw a similar line a month later we shall notice that it is not an east and west line, but that the end pointing toward the sun is nearer the south and that the other end is nearer the north. This shows us that the sun has moved south. For three months the line will continue to point farther and farther away from east and west, showing that the sun is still moving southward. On December 21, the line will begin to shift back toward the first position, and three months later, that is, on March 20, it will again point east and west.

If we continue to watch the sun from March 20 to June 21, we shall learn that it keeps on moving northward and that it is higher in the sky each morning. How does the sunlight on the floor teach us this? From June 21 to September 22, the sun moves southward and is lower in the sky each day. How may we learn this from the sunlight on the floor?

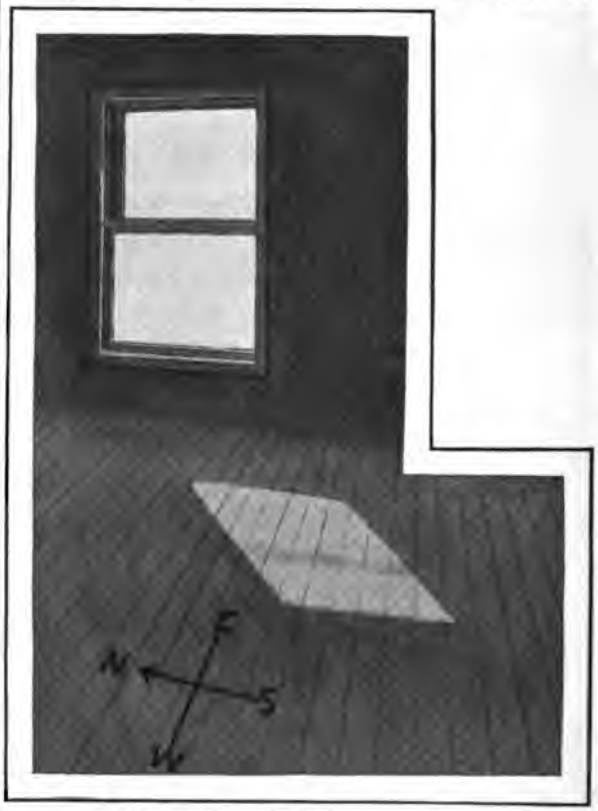

FIGURE 38. Sunlight in summer.

Direction Learned from Shadows. We have now found east, west, north, and south, from the shadows cast by the stake. The marks at the end of the shadow at nine o'clock and three o'clock are half way between north and west, and north and east, or

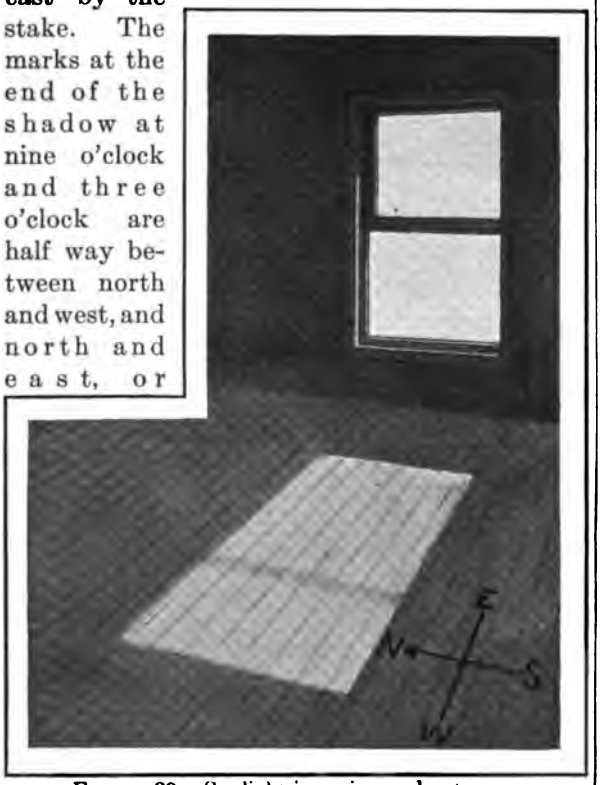

FIGURE 39. Sunlight in spring and autumn.

northwest and **northeast** as we call them. The direction opposite to northeast is **southwest,** and that opposite to northwest is **southeast.** We have now named the eight leading directions, or points of the compass.

What Shadows Teach Us about the Sun. Let us drive a **stake** into the ground, so that it stands vertically, and observe its shadow at sunrise on September 22. The shadow points toward the west, because, as we have learned, the sun rises exactly in the east on that day. Drive a peg into the earth at the end of the shadow and measure the distance from the peg to the stake. Observe the shadow again at noon on the same day; drive another peg at the end of it and measure again. Compare this measurement with that of the morning shadow. It is much shorter. Observe the shadow again at three o'clock, and at six o'clock. You find that it is growing longer. The **direction** of the shadow when it is shortest is north, and the direction opposite to this is south.

How the Days Change in Length and Warmth. When we made our observations of the weather, we found out the length of the day by looking at the calendar. We learned that on September 22 and on March 20, the days and nights are each twelve hours long. As summer comes on, the days grow longer; but with the approach of winter, they grow shorter. The shadow cast by the stake will be shortest at noon on June 21. The sun is then nearly overhead and the days are longest. Find out how long the day is at this date where you live.

Although the days are longest about June 21, the weather is often much hotter in July and August. This is because the earth stores up more heat than it gives off until about the middle of August. After that it begins to give off more than it receives. Thus the weather is hottest in July and August for the same reason that the hottest part of the day comes about two o'clock in the afternoon.

Summer and Winter. In our country we divide the whole year into four **seasons.** The two which are most unlike each other are summer and winter. During the summer we have hot weather with much rain, which makes the grass and grain grow. At the close of the long hot days of summer, we frequently have heavy showers with thunder and lightning. The weather is often so hot that men suffer greatly and sometimes die. Toward the middle of the summer, farmers gather their crops. Flowers bloom and fruits ripen. The schools are closed and the children enjoy summer sports. Our summer begins with June 21, the longest day of the year, and lasts until September 22, when the days and nights are equal.

Winter begins December 21, and ends March 20. You will notice that it begins on the shortest day of the year, and it ends when the days and nights are equal, so that it is

just the opposite of summer. The path of the sun is lowest in the sky when winter begins, and the days grow colder and colder until about the middle of January. The ground in the colder parts of our country becomes covered with snow and ice, the plants die, and little work is done in the country except caring for the animals, cutting ice on the lakes and streams, and cutting timber in the forests. Instead of boating and bathing the children play at skating and coasting.

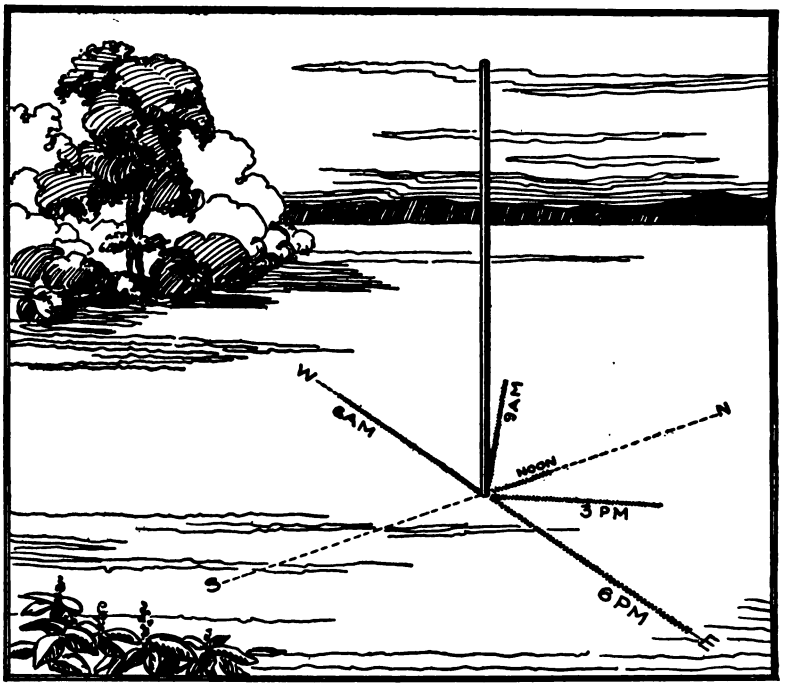

FIGURE 40. A vertical stick and its shadow at different times during the day. Note the length and direction of the shadow at different hours.

Spring and Autumn. The season that comes between winter and summer is called spring. The days gradually increase in length and there are frequent showers. As the ground thaws and becomes warmer, the farmer plows his fields and plants seeds for his summer crops. Soon it becomes warm enough for seeds to sprout, and plants begin to put forth leaves and blossoms.

Between summer and winter we have autumn. This is the opposite of spring; instead of blossoms, we have fruit on the trees, and the crops are harvested. Both spring and autumn begin when the days and nights are equal, but spring ends when the days are longest, and autumn when the days are shortest.

REVIEW. (1) Which part of the day is the warmest? How do you explain this? (2) At what time of the day does the earth begin to give out more heat than it receives? (3) At what times does the sun rise exactly in the east and set exactly in the west? How long are the days and nights at these times? (4) After what date do the days begin to grow longer? When do they begin to grow shorter? (5) Where does the sun appear to be when the days are longest? Where when the days are shortest? (6) How can you tell the points of the compass by means of shadows? (7) Which month of the year is likely to be the hottest month? How can you explain this? (8) Write a paragraph on each of the four seasons telling about the position of the sun, the length of the days, and about the work and sports in which people are engaged in the part of the country in which you live.

OBSERVATION WORK. (1) Notice the position of the sun at noon at your home and determine in which direction your house faces. (2) In what direction do you walk in going from your home to school? (3) Observe the shadows of the trees, posts, or other familiar objects near your home and notice in which direction they fall at morning, noon, and night. In what part of the sky is the sun at each of these times? (4) At what time of the day are the shadows shortest? (5) Compare the length of the shadows in winter with their length in summer. (6) Notice the position of the sun at each of these seasons. When is it highest in the sky? (7) Watch the place of the sunrise at different times during the year. Does it appear always to rise in the same place? (8) From the almanac find the length of the day on the first day of each month. (9) Notice the temperature when the sun is high up in the sky — nearly overhead — and compare it with the temperature when the sun is low in the sky.

SUPPLEMENTARY READING. *Payne:* Geographical Nature Studies. *Frye:* Brooks and Brook Basins, Chapter 10. *Fairbanks:* Home Geography, pp. 34–37. *Jackson:* Astronomical Geography, Chapter 9. *Strong:* All the Year Round, Parts I, II, III, IV. *Wilson:* Nature Study in Elementary Schools.

VII. HILLS AND VALLEYS

Slope is the Cause of Drainage. When water falls upon the earth it does not remain where it falls, but much of it runs off in one direction or another. This shows that the surface of the land is not level like the floor of a house, but that it slopes like the roof. The slope of the land is very important, for it causes all the surplus water to flow off into the streams.

The carrying away of the rainfall of a country by means of slopes and streams, is called *drainage*. Good drainage is secured even where the slope is very moderate, because water will always flow to the lowest point of the land, no matter how gentle the slope, and will finally reach the ocean. Drainage is important in both city and country, for if the water remained in one place it would soon become foul and cause disease, and the ground would be too wet for cultivation.

Most of the land has a natural slope which secures good drainage; but some of it is very low and flat. The water collects, and swamps and marshes are formed, which are of no use for cultivation until drained.

FIGURE 41. A country which has many hills and valleys. Such land has good drainage.

In the city, the streets and sidewalks are so constructed that the sidewalks slope toward the streets, and the streets are higher in the middle than on the sides. Therefore, when it rains, the water flows into the gutters at the sides of the streets, and is then led into the sewers which are generally built beneath

HOW TO STUDY. In this, and the next four chapters, we shall study hills, valleys, mountains, lakes, brooks, rivers, and plains. All these are different forms of land and water. Those of us who live in the country will be able to observe and study some of these forms by actually visiting them; and some of us who live in the cities may find lakes and hills, and perhaps other land and water forms in some of our parks; or the city in which you live may be built near a river or a lake. But if it is impossible for us to study *real* forms of land and water in nature, the next best thing is to study good pictures of these forms and to read carefully the descriptions of them given in the lessons in this book or in some other book. It is important to study the effect of sloping surfaces during a rainfall, for nearly all the varieties of land surfaces can be traced in some way or other to the effects of *water flowing down a slope*. Observe also carefully any rocks, stones, or other minerals which you happen to see on your walks. You may find some containing veins and others made up of layers or which have been worn into irregular shapes by the water or by slow decay. Remember that all mountains and rocks are minerals or collections of minerals. Notice the position of the horizon, and how it changes when you climb to a high place either on the top of a building or a hill. The more of the earth you can see at one look, the better idea you will have about the forms of land and water.

the streets with openings at the street corners.

How a Hilly Country Looks. Do you live in a rolling country or on a plain? The haying scene on page 52 shows a country made up of hills of different heights, of steep slopes and gentle slopes, and stretches of nearly level land. If you should climb to the top of a high hill in such a country, you could see dozens of other hills, besides valleys and level fields. But if you live on a plain, the country everywhere looks the same, and you would not know that it had any slope at all except by noticing that the streams flow in certain directions.

Hills Form Watersheds. Hills are elevations of land, usually composed of soil, sand, and gravel. They are seldom more than a few hundred feet in height, and are often found in irregular rows or ranges forming long ridges like the ridge of a house, which cause the water to flow in two directions. For this reason ranges of hills are called watersheds, and streams are usually found between them. The valleys wind in and out following the direction of the watersheds; but every valley slopes in the direction of the stream which flows through the lowest part of it.

FIGURE 42. Land without drainage; a swamp in Arkansas.

The top of a hill is called its **summit,** and the foot of a hill, its **base.** The sides of a hill are its **slopes.** Steep hills along the banks of rivers are called **bluffs.** Some hills have been formed by running water. The streams have cut valleys through the land and the ridges left between them have become ranges of hills. Other hills have been formed in a very different way (*page 119*).

How the Surface of the Land Changes. The hills, slopes, and valleys of a country are all the time changing, because the water which falls upon them carries the finer part of the soil from the hills and slopes down into the streams in the valleys. If the slope of a valley is very gentle, it will, after a time, be filled up with soil washed from the higher places; but if the slope is steep, the soil will be carried far down stream, leaving the valley deeper and deeper. But a time will come when even a steeply-sloping valley cannot be cut any deeper, and then it will begin to fill up, beginning in the lowest part near the mouth of the stream.

Hills and Valleys as Homes. Would you rather have your home on the top of a hill or in a valley? If you prefer the hill top, you will doubtless say that one can see a great deal more from an elevation than in a valley. The air, too, would be more healthful, and cooler in summer. But if you prefer to live in the valley, you might say that it is more convenient to live on level land than on a hill, and that a home in the valley would be warmer in winter.

There are several good reasons why people prefer to live in valleys. The first is, that the land in the valleys is better for farming, because the soil is deeper; another reason is the convenience of being near wagon roads and railroads, which are nearly

always built through valleys rather than along hills. Then, if the valley contains a stream on which boats can sail, it would be pleasant to live near the stream.

Nearly all our large inland cities have grown up in valleys, because of these advantages. If you lived on a hill, everything that you needed would have to be carried from the road in the valley to your home. It is difficult to obtain water on a hill, but very easy in a valley.

In some old countries, we may see many castles, forts, and other structures built on the tops of hills. The forts were built in the highest places because they could more easily be defended. Many centuries ago, very common among the petty k nobles in the countries of Euro noble would build his castle on a hil bluff overlooking some river. He s it with strong walls and a broad dee moat filled with water so that it cou easily captured by his enemies.

The early settlers in New Englan built their homes on the hilltops an roads over the hills so that they cou from the attacks of Indians. Mo prefer to live on hills or mountains d summer, but in the valley, or in during the rest of the year.

REVIEW. (1) How can you show that the land is nowhere exactly level? (2) What is the advantage of having the land slope? (3) Why is drainage necessary in the city? (4) How are the streets and sidewalks built in order to secure drainage? (5) How is drainage accomplished in the country? (6) Why is it necessary for swamps to be drained? (7) What is a hill? What is meant by the summit, the base, the foot, and the slope of a hill? (8) What is meant by a bluff? (9) In what way have some hills been made? (10) How does water help to change the hills, slopes, and valleys of a country? (11) What are the advantages of living on the top of a hill? (12) What are the advantages of living in a valley? (13) Why were forts and castles built on the tops of hills? (14) Why did the early settlers in our own country build their homes on the hill tops? (15) Why are rows or chains of hills called watersheds?

OBSERVATION WORK. (1) Notice the street or road in front of your house and decide in wh it slopes; if you are in doubt, watch it du (2) Climb to the top of a hill if you live near the steepness of the slope. Notice the kind c at the top and on the slopes of the hill, and foot of the hill. Do you note any difference? in what direction the hill slopes, and ask som you how high it is. (4) When you are at th hill, look about you to see other hills, slopes, See if you can find chains of hills. (5) If there is the valley near your home, find out where the on each side of it are located. (6) Name s which are so made that the water will run of

SUPPLEMENTARY READING. *Brig* Trail to Railway, pp. 129–141. *Fairbank* United States, pp. 168–186. *Fairbanks:* Ho phy, pp. 84–89. *Payne:* Geographical Nat pp. 36–51. *Hutchinson:* The Story of the Hi

FIGURE 43. A fertile valley where men make their homes.

VIII. MOUNTAINS

How Mountains Differ from Hills. One could easily climb to the top of a high hill in half an hour; but to climb a mountain might require many days or even weeks, for some mountains have a height of many thousands of feet. The surface of hills is smooth, and generally covered with grass or trees, but mountains often have rough and jagged surfaces. Hills are composed of sand and soil, but mountains are chiefly solid rock. Some mountains have steep slopes without any soil or vegetation; others have gentle slopes and rounded tops, and are covered with dense forests; some mountains rise so high that their summits are often above the clouds, and are covered with ice and snow throughout the year.

FIGURE 44. A mountainous country.

Distant and Near Views of Mountains. Mountains, like hills, are often arranged in long ranges and **chains.*** At a great distance, a mountain appears like a mass of bluish gray clouds, and when the air is hazy, one can scarcely tell the clouds from the mountains. On clear days, you can distinguish the sky line, or **horizon,** by the summits rising up here and there, and by the lower places which show where the valleys are.

As you approach the mountains their appearance changes. While still many miles away you begin to see that instead of a rounded outline, the summits are very irregular, and there are deep gorges and valleys between them. Some of the mountain tops are covered with snow, while others are clothed with forests. On coming nearer, one can see many places that are bare of vegetation except here and there a stunted tree or bush, which has fastened its roots into a crevice in the rock. At last, you begin to see that many of the valleys are filled with ice and snow, and perhaps you may also see swift streams rushing down the mountain sides and leaping from cliff to cliff into the lower valleys. Where the

* See definitions of these words at end of Section IX.

mountains are very high, you can see, even at a distance, forests at the base and on the slopes, but that, above a certain line, there is no plant life whatever. We sometimes call this the **timber line.** We can also see the line where snow begins, and we speak of this as the **snow line.**

Mountain Climbing. To study a mountain carefully we should actually journey from its base to its summit. We should need to take with us a supply of provisions, warm clothing, axes, and sharp pointed staffs to help us in climbing. We should need also a thermometer to measure the temperature at different points, and a barometer to measure the height of the mountain. We should doubtless make the first part of our journey on the backs of mules or donkeys, as these animals are sure-footed and can step safely and easily on rough paths. these forests we reach the evergreen trees, such as pine, cedar, hemlock, and spruce, for such trees require a cold climate.

By this time we shall find, by consulting our barometer, that we are more than a mile above sea level. During the third mile of our ascent we find the trees becoming fewer in number and dwarfed and stunted in size. Finally there are only a few scattered shrubs and bushes, and some rough grasses and mosses. We begin to see ice in the valleys and snow on the mountain sides. We are approaching the snow line.

We must now abandon our mules, if they have brought us thus far, and continue the journey on foot with the aid of mountain staffs and axes. This part of our journey is dangerous, for one misstep would send us tumbling down the mountain side, or over a cliff. We come to deep gorges and crevasses,

FIGURE 45. A near view of mountains covered with forests.

If our mountain happens to be in a warm country we may see flowers, palm trees, and thick shrubbery until we have climbed far up the slope. Then we come to forests of maples, oaks, elms, and other trees which shed their leaves in autumn. After passing up through which must be crossed by making a bridge of ropes, or by using a portable bridge which we have brought with us.

At last we stand upon the snow-capped summit astounded at the magnificence of the view spread out before us. We see hundreds

of ice-capped peaks glittering in the sun or shrouded in mist. Clouds hang upon the mountain sides and icy streams leap over the cliffs, breaking into spray and foam.

Perhaps we have been forced to camp out for several nights during our journey and we have suffered from the fierce snow storms and biting winds which chill us even through our fur coats and caps; but the mountain climber feels fully rewarded for his toils when he has attained to regions perhaps never before explored by men, and has added a few more facts to our knowledge of the earth.

FIGURE 46. Mountain climbing among the Alps: crossing the Mer de Glace, or Great Glacier, on the slope of Mont Blanc.

The Climate of Mountain Regions is Cool. The weather in high mountain regions is much colder than it is in the lowlands. The snow on the summits, the ice in the valleys, and the lack of plants and trees tell us that this must be true. Even in hot countries, the tops of mountains are always cold.

Mountain climbers have found that the thermometer falls one degree for every 300 feet of ascent, and therefore, at the top of a mountain 18,000 feet high, the thermometer would be 60° lower than at the base. According to this, where the temperature at the base of the mountain is 80°, the weather at the summit would be 20°—far below the freezing point; and the snow and ice would remain there all through the year. Between the base of the mountain and its top we should find all kinds of climate from very hot to very cold.

Mountains are Rain Catchers. In the lesson on "Rain and Air," we found that vapor is changed to rain by being cooled. Now, think what must happen when great masses of cloud vapor are pushed up the sides of mountains by the wind. When the vapor reaches a region cold enough, it is condensed into rain. The masses of vapor which reach the mountain top will fall in the form of snow. There are many mountains on the earth which are near the ocean, the vapor from which is carried over them by the wind. Such mountain regions are the rainiest places in the world. The annual rainfall sometimes amounts to fifty or sixty feet.

We have learned that cold air sinks and that warm air rises. The cold air in mountain regions moves downward and spreads out over the warm lowlands, giving them a cooler climate than other lowlands which are distant from mountain regions. Mountains have another effect on climate which is easily understood. The slopes toward which the winds blow from the ocean, receive much rain; but the slopes on the sides opposite the wind, receive little or no rain. Many regions of the earth are deserts, because the rain is shut off by mountain ranges.

Mountains are the Sources of Streams. In the shade of the forests which cover their slopes and summits, moisture from the rains is stored up, to be yielded slowly to feed the streams that flow down the mountain valleys, supplying fresh water to the inhabitants of the lowlands. During the spring and summer, the snow and ice in the higher regions melt and help to swell these mountain streams.

Sometimes the mountain streams are dammed up to make reservoirs, which store enough water to moisten the crops during the dry season. The water is used also to turn the wheels of factories or of dynamos which furnish electric power for running trains and

lighting the streets and houses of neighboring cities.

Mountains are Storehouses of Minerals. Much of the rock of which they are

FIGURE 47. Rock layers that have been folded, twisted, and set up on edge so that they are nearly vertical. Compare this picture with Figure 48, where the layers of rock, seen in the walls of the chasm, are *horizontal*.

made contains gold, silver, copper, lead, and other metals. Rock which contains a metal is called ore, and is usually found in veins, or fractures, which were filled with the ore after the mountains were formed. Sometimes these veins reach hundreds of feet down into the earth, and deep mines must be dug to obtain the ore.

How Mountains were Formed. In a former lesson we learned that some hills have been made by running water. Some mountains also have been made in this way. In high regions, where the swift streams have cut out deep valleys, mountain ridges are left on either side of them. Most mountain ranges have been made by the gradual rising of the earth's surface. The rocky layers of such mountains are often bent, folded, and twisted, as though they had been crushed together by the hands of giants. After such regions had been slowly lifted up, they were worn into jagged peaks and rocky canyons by ı streams.

Mountains are Summer Resorts people visit mountains during the time because the air is cool and l and because the scenery is fine. accommodating hundreds of pe sometimes built on the very sumr are reached by stages, or by cars c the mountain side by cables.

The most famous mountain resor world are in Europe among the Al are visited every year by thousands c from all parts of the world. A favori ment of the visitors is mountain and many days are often spent on ; to some lofty snow-covered peak dangers beset the mountain clir avalanche of snow may bury him, or ing glaciers, he may fall into a fr crevasse, some of which are hundrec deep.

FIGURE 48. Ausable Chasm, New York. T River has here cut a deep gorge with vertic

REVIEW. (1) Compare the height of hills with that of mountains. (2) In what other ways do mountains differ from hills? (3) How do mountains appear when seen at a great distance? (4) How does their appearance change as you approach them? (5) What is meant by the "timber line"? By the "snow line"? (6) Write a story of an imaginary visit to a mountain. (7) What plants might you find at the base of a mountain in a warm country? What plants might you find in a cold country? (8) How do we know that the weather on the tops of mountains is cold? What has been proved about the temperature of mountains? (9) If the mountain is in a warm country, what kinds of climate would you find on its slopes? (10) What is the effect of cold mountain tops on cloud vapor? (11) Why does snow remain on the tops of very high mountains? (12) Why do the windward sides of mountains have more rain than the leeward sides? (13) On which side would you expect to find deserts? (14) Make a list of as many things as you can for which mountains are useful.

OBSERVATION WORK. (1) If your home is in sight of any mountains describe how they appear. (2) If you have ever visited a mountain, or have ever climbed to the top of one, write a story about what you saw.

SUPPLEMENTARY READING. *Brigham:* From Trail to Railway, pp. 167–181. *Lyde:* Man and his Work, pp. 43–48. *Fairbanks:* Western United States, pp. 50–74. *Chamberlain:* North America, pp. 126–133. *Tarr:* New Physical Geography, Chapter VI. *Shaler:* First Book in Geology, Chapter V. *Youth's Companion Series:* Strange Lands near Home, Under Sunny Skies. *Fairbanks:* Home Geography, pp. 97–102. *Jordan:* Science Sketches, The Ascent of the Matterhorn. *Kingsley:* Madam How and Lady Why.

OBSERVATION WORK. (1) Visit the stream that is nearest your home and go as far toward its source as you can. (2) Follow its course and observe the work it does. (3) Watch it during a rain and observe how muddy the water becomes. (4) Find places along the bank where it has left deposits of mud and sand. (5) If it overflows, look for the deposit left by its waters. (6) Watch the bed of the stream where the water flows around large stones or rocks; notice how it cuts the soil from under them letting them fall down stream. (7) Find a place where the water flows against a bank cutting under it and causing it to cave in. (8) What becomes of the part of the bank which falls into the stream? (9) Study the land on each side of the stream and you may find the results of some of its work. Perhaps you will see old channels which have been abandoned long ago. (10) Visit the mouth of the stream and notice the material which it has deposited there, if any. (11) Think now from what you see, how much the stream would do in the course of centuries toward the wearing out of a valley. (12) Notice the slopes, hill, watersheds, and the drainage basin of the stream, as well as the main stream and its tributaries.

SUPPLEMENTARY READING. *Payne:* Geographical Nature Studies. *Frye:* Brooks and Brook Basins. *Lyde:* Man and his Markets, pp. 151–168. *Fairbanks:* The Western United States, pp. 1–9. *Chamberlain:* North America, pp. 99–114. *Tarr:* New Physical Geography, Chapter IV. *Shaler:* First Book in Geology, Chapter VI. *Kingsley:* Madam How and Lady Why, Chapter I. *Avebury:* The Beauties of Nature: Chapters 7, 8. *Parker and Helm:* Uncle Robert's Geography, Book III, pp. 135–191.

IX. PLAINS

Different Kinds of Plains. When a portion of land is nearly level it is called a plain. Plains that have been formed along the banks of rivers are called **alluvial** plains, and those along the seashore, **coast** plains. Higher plains found among mountain regions are known as **plateaus.** In some parts of the world there are plains almost entirely without rain; as these plains have no plant life we call them **deserts.**

Plains Make Good Farming Land. When plains are well watered, they are the best kind of land for farming. If the slope of land is too steep, the soil is washed away; if there is too little slope, the water is not drained off and the land becomes swampy. But if the slope is moderate as in the case of most plains, the water runs off slowly, and easily soaks into the ground, so that the soil is kept moist for a long time.

The soil of plains, as we have learned, is much deeper than that of hills, and it keeps its fertility for a longer time. The best farm lands in the world are the alluvial plains of broad river valleys. They are noted for their crops of corn, wheat, and other grain. The coast plains in warm climates are usually well adapted to cotton, rice, sugar-cane, fruits, and vegetables.

How Plains Save Labor. Where farming land is rough and hilly, much of the work must be done by hand; but on plains, nearly everything can be done by machin-

ery. Motor plows are used to cut many furrows at a time, and the sowing, harvesting, and threshing of grain is done by means of drills, reapers, and threshing machines. It is much easier to transport crops where

FIGURE 49. Farming scene on the prairie in Iowa. A "sulky," or two-wheeled, plow at work.

the land is level. Wagon roads and railroads can be more cheaply built, and heavier loads can be hauled. Farming tools last much longer where the land is smooth and level than where there are hills and rocks.

Life on a Plain. People accustomed to living among hills and valleys, would probably not enjoy life in a level country. Instead of the variety of scenery afforded by hills, valleys, and forests, one sees on a plain the same view in every direction. In an uneven country, the highways and railroads wind through the valleys and climb over the hills, but on a plain they are laid out in straight lines.

The Mississippi Valley is the largest plain in the United States. It is about 1,000 miles from east to west and 1,500 miles from north to south. A part of it is **prairie** land, having fine black soil and few trees. Before the prairies were settled, they were covered with tall grass, higher than a man's head, which supported herds of buffalo and deer. Now they are divided into farms where enormous crops of wheat, corn, oats, and hay are raised.

The great farms or plantations in the southern part of the Mississippi Valley produce corn, cotton, rice, and sugar-cane. The western part has less rain than the eastern and southern parts, but is excellent grazing land. Some parts of the Central Plain are still covered with forests, while in other parts there are mines of coal, iron, and copper, or oil wells which supply kerosene for lighting our homes. You see, therefore, that this great plain is a storehouse for all kinds of things needed by man.

DEFINITIONS

(1) A **Hill** is a moderate elevation of land, usually composed of soil, sand, and other loose material.
(2) A **Mountain** is a high elevation of land composed chiefly of solid rock.
(3) A **Mountain Peak** is the highest and steepest part of the mountain.
(4) A **Mountain Range** is a series of mountains arranged in a long row, or belt.
(5) A **Mountain Chain** consists of a number of ranges having the same general direction.
(6) A **Mountain System** consists of a number of ranges and chains having the same general direction.
(7) A **Mountain Pass,** or **Gap,** is a valley running across a mountain range.
(8) A **Volcano** is a mountain that sends forth steam, lava, and other hot material through openings in its sides or top, called craters.
(9) An **Avalanche** is a mass of snow, ice, earth, and stones falling down the slope of a mountain.
(10) A **Landslide** is a mass of earth and stones falling down a steep slope.
(11) A **Watershed** is a ridge of hills or mountains, which causes water to flow in different directions.
(12) A **Valley** is low land between hills and mountains.
(13) A **Gorge,** or **Canyon,** is a deep valley with steep and rocky sides.
(14) A **Plain** is a tract of land nearly level.
(15) A **Swamp** is land which is kept wet through lack of drainage or by the tides of the ocean.
(16) A **Plateau** is a high plain found in or near mountain regions.

(17) A **Glacier** is a stream of ice flowing down a valley.
(18) The **Snow Line** is the line on a mountain, above which snow remains all the year.
(19) The **Timber Line** is the line on a mountain, above which trees are not found.

REVIEW. (1) What is meant by a plain? (2) What is an alluvial plain? (3) What is a plateau? (4) Why are some plains called deserts? (5) Why do plains make the best kind of farm land? (6) Why is the soil on plains deeper than on hills? (7) What crops are raised on alluvial plains? On coast plains in warm climates? (8) Why is the farm work on a plain easier and less expensive than on hills and mountains? (9) Give reasons why you would rather live on a plain than on a mountain; or give reasons why you would prefer to live on a mountain. (10) What is the largest plain in the United States? (11) What might you see growing in the southern part of the Mississippi Valley? (12) What might you see in the western part?

OBSERVATION WORK. (1) If you live on a plain or should visit one, try to decide in which direction it slopes. (2) Notice that the effect of rainfall on a plain is quite different from its effect on hills and mountains. (3) If you live in the country, notice how easily crops can be raised and gathered on a plain compared with crops on steep slopes. (4) Why should athletic grounds, such as tennis courts or ball grounds, be as level as possible? (5) Describe any swamp that you have seen. How was it kept wet? What kind of plants grew there? How can swamps be drained?

SUPPLEMENTARY READING. *Lyde:* Man and his Work, pp. 43–48. *Chamberlain:* North America, pp. 115–125. *Long:* Home Geography, p. 31. *Dodge:* A Reader in Physical Geography, pp. 89–92, 137–143. *Herbertson:* The British Empire, pp. 35–38.

X. BROOKS AND RIVERS

Springs are the Sources of Streams. In a former lesson we learned that part of the rain soaks into the earth and forms underground streams, which come again to the surface as springs. The tiny rivulets which trickle out from many springs unite to make a brook. As brooks flow onward through their valleys, they are joined by other rivulets and brooks, and become larger and larger.

In a rolling country there are many little valleys, each of which contributes its brook to join the larger stream or river in the wider valley. Sometimes one valley meets another; then their streams unite. Such a meeting of rivers is called a *junction*.

Some Rivers Rise in Ponds and Lakes. In mountainous countries there are many low places surrounded by hills. Such places are sometimes called **basins.** Many of these basins are kept filled with water by rivulets and brooks flowing from bordering mountains, thus forming ponds or lakes. When a lake basin is filled, it overflows at its lowest point and becomes the source of a stream.

Melting Ice and Snow Form Streams. In high mountain regions, where there is a great deal of snow all through the year, the

FIGURE 50. The Indus River in India. Notice the many windings of the stream and the plain which it has built up.

valleys become filled with ice, which moves gradually down the slopes. The warmer weather in the lower part of the valley melts the ice, which thus becomes the source of a stream. Some of the great rivers of Europe begin in this way.

The Work Done by Streams. It will help us to understand the work of rivers, if we study a little further the work done by the

FIGURE 51. A spring which is the source of a stream.

rain on the hillside (see *page 20*). The water soon gathers into little rivulets, each of which cuts out for itself a channel as it flows along. The little rivulets join to make larger ones, which wash out wider and deeper channels. As each stream grows larger, its water becomes more and more muddy on account of the fine soil which it washes down from the slopes. After many rains, the sloping sides of these channels are worn back so far that they meet other slopes, thus forming ridges.

These little rivulets on the hillside teach us what the great rivers in every part of the earth are doing on a larger scale. Their channels grow into gorges and valleys, and their ridges become chains of hills and mountains.

The Work of a Mountain Stream. Some rivers begin far up among the mountains. In the spring, when the snow melts and the rains are heaviest, these mountain streams become swollen torrents. They rush down the mountain side among the rocks and stones, tumble over steep cliffs, and dash onward through their rough channels. They carry along soil, stones, and gravel, and grind them into mud and sand. Their swift waters wash the sand from under the larger rocks which lie in the stream bed, causing them to fall forward and move slowly down the stream.

After this process has gone on for many years, deep gorges are formed in the mountains; the soft rock in the bed of the streams is worn away, and only the harder ledges are left, over which the streams break in rapids and cascades.

The Middle Course of Streams. After leaving the mountains, the course of a river usually lies among plateaus and uplands, by which most mountain regions are bordered. The current of the river becomes slower, but is often broken by waterfalls made by the wearing away of the softer rock, as in the upper course. If the layers of hard rock have a steep slope, the river rushes down the incline, forming rapids. Finally, it leaves the plateau and makes a last leap down to the lowland plain through which it runs to the sea.

It is in their middle courses that rivers first become useful for transportation. Here they

FIGURE 52. Loon Lake among the Adirondack Mountains.

are usually navigable for small vessels, which, if there are no rapids or waterfalls in the way, may sail all the way to the ocean. Many manufacturing towns have been built near the rapids of rivers, so that the force of the

falling water may be used to turn the machinery. In order to make this use of the water, a dam must be built across the stream where the rapids begin. Below the rapids stands the factory, into which the water is led from the dam. There it is made to pass through waterwheels, which run the machinery.

A City is Built at the Head of Navigation. By the time the river has reached its lower

FIGURE 53. Valley of the New River in the Appalachian Highlands.

course, it has received many tributaries, and has become deep enough to float large vessels. The point where it makes its final plunge into the lowlands is usually the site of a large city. We call such a place the head of navigation, because large ocean vessels can usually ascend the stream to that point.

You can easily see that the head of navigation is a good place for a large city to grow up, as it receives all the products of the factories along the middle course of the river, and all the produce from the farms on both sides; it can send away these products to other countries, and it can receive the products of other countries in exchange. Such a city we call a *commercial* city.

Tides and Estuaries. The channel of a river in its lower course is usually kept full by numerous tributaries, so that it does not become too shallow for navigation during the dry season. In many rivers the tides from the ocean ascend as far as the head of navigation. Such river mouths, or estuaries, make excellent harbors. Nearly all the great seaports of the world are built near estuaries.

Flood Plains and River Deltas. Rivers dispose of the sediment brought from their upper courses in two ways. In cases where they overflow their banks during the rainy season, the waters spread far and wide over the country, forming a great lake. The sediment then settles, and when the waters again return to the channel, a layer of mud is left on the land. As this mud coating becomes deeper each year, a plain which we call an **alluvial,** or **a flood plain,** is finally built up along the river.

In countries where men have settled along the rivers, and cities and towns have grown up, high banks of earth are constructed to prevent water from overflowing. Where this is done, no more soil can be added to the flood plain.

The sediment which a river carries to the ocean, settles to the bottom near the river's mouth. After a time this mud bank rises above the water in the form of a triangular

FIGURE 54. The upper course of a river; scene on the Kennebec in Maine.

piece of land, which we call a **delta.** The first river delta that men became acquainted with, was the one at the mouth of the river Nile in Africa. Because it was triangular like the fourth letter of the Greek alphabet, they called it a "delta," from the name of that letter.

The deltas of rivers, as well as their flood plains, are the most fertile farming lands in the world, because they are formed from the best soil of the mountains and uplands.

When the enlarged Erie, or Barge, Canal across New York State is completed, it will be possible for ocean steamers to go all the way

FIGURE 55. The middle course of a river; the Hudson at West Point.

from New York to Chicago, where they may pass through the ship canal, connecting Lake Michigan with the Mississippi River System, and continue south to the Gulf of Mexico. Thus, the labor of carrying products to the seaports by railroad, and then transferring them to ocean vessels, will be avoided.

The Use of Rivers for Irrigation. Rivers that flow through dry countries are often made use of to moisten the land, so that farming can be carried on. For this purpose, immense dams are built where the river makes a descent from one level to another. Canals are then dug to carry the water from the dam to the land where it is needed. From these main canals, smaller ones branch out, so that the water may be distributed over the farms. The smallest of these canals are merely ditches between rows of trees, or extending through the fields of corn, or other crops. By means of irrigation, a vast amount of land in the southwestern part of our country has been turned from a desert into productive farms, orchards, and gardens. The largest irrigation dams in the world are those on the river Nile in Egypt, a country which receives no rain at all, and which without the water of the Nile, would be only a sandy desert.

River Systems and River Basins. The main stream of a river, together with all the tributaries that it receives, is called a river system. These tributaries are sometimes numbered by hundreds and even thousands, and they reach far out into the uplands and mountains on both sides of the main stream. All the land drained by a river system is called a river basin. River basins are sometimes very large; the Mississippi basin for example includes more than one-third of the United States while the basin of the Amazon River in South America is nearly as large as our entire country.

Rivers are Useful for Drainage and Transportation. Rivers form a system of channels, through which the surplus rainfall of the river basin is carried away to the sea. Where the channels are not wide and

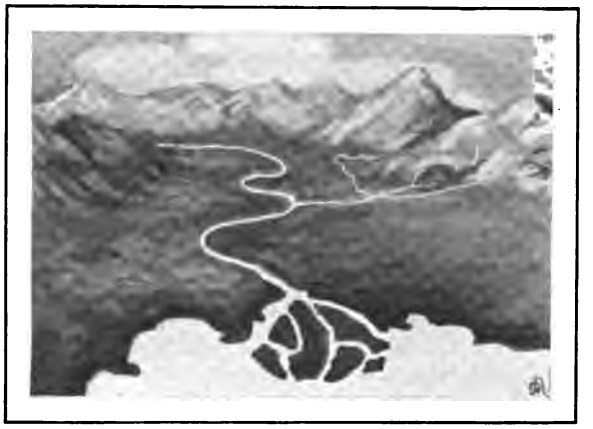

FIGURE 56. A river delta.

deep enough to carry away this water, destructive floods often occur. Houses and villages are swept away, and many lives and much property may be lost.

It is much cheaper to carry the products of a country by water than by land, especially heavy products like grain, lumber, and coal. For this reason great pains are taken to improve the navigation of rivers by building canals around waterfalls, and from

one river to another. In countries where there are no navigable rivers or railroads, goods have to be carried on the backs of animals and men.

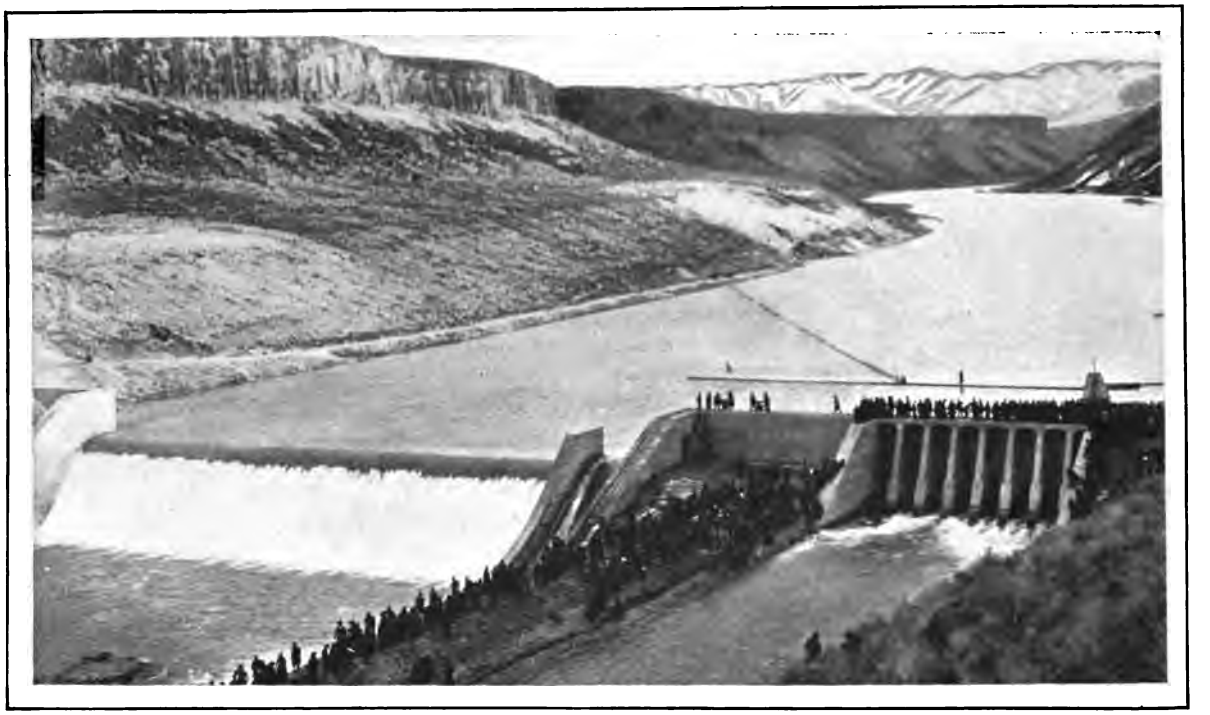

FIGURE 57. Irrigation dam on Boisé River, Idaho. Notice the canal on the right.

DEFINITIONS

(1) A **Spring** is an underground stream of water coming to the surface.
(2) **Brooks, Creeks,** and **Rivers** are streams of water flowing through the land.
(3) The **Source** of a stream is the place where it begins.
(4) The **Mouth** of a stream is the place where it discharges its waters into another stream, or other body of water.
(5) An **Alluvial,** or **Flood, Plain** is a plain which has been built up by the soil left from the overflow of rivers.
(6) A **Delta** is land at the mouth of a river formed from the sediment brought down by the river.
(7) The **Bank** of a stream is the land bordering it.
(8) The **Right Bank** is the bank on the right hand as you go down stream.
(9) The **Left Bank** is the bank on the left hand as you go down stream.
(10) The **Channel** of a stream is the lowest part of the valley through which it flows.
(11) The **Bed** of a stream is the bottom of the channel.
(12) A **River System** consists of the main stream with all its tributaries and their branches.
(13) A **River Basin** is the land drained by a river system.
(14) A **Tributary** is a stream which flows into another stream.

REVIEW. (1) Tell about the different ways in which rivers are formed. (2) Tell how ponds and lakes are formed. (3) Describe the work done by little rivulets on a steep hillside. (4) What is meant by the channel, and by the bed of a stream? (5) What is a ridge? (6) In the case of large streams, what do slopes and ridges become? (7) What would you expect to find in the bed of a mountain stream? (8) Describe the way in which such a stream makes sand and boulders. (A boulder is a large stone that has been worn smooth and nearly round.) (9) How are rapids formed? (10) How are cascades and waterfalls formed? (A cascade is merely a small waterfall). (11) For what do rivers become useful in their middle courses? (12) How are rapids and waterfalls avoided in transportation? (13) What use is made of rapids in running factories? (14) Compare the lower course of a river with its upper course. (15) What is meant by "head of navigation"? (16) Why is the head of navigation a good location for a city? (17) How are flood plains formed? (18) How are deltas formed? (19) What are tributaries? (20) What is a river system? (21) Name two of the largest river systems in the world. (22) Name three important uses of rivers. (23) In what ways are rivers useful? (24) Describe the method of irrigation. (25) Study the picture on this page and notice the different parts of the irrigation dam.

XI. PONDS, LAKES, AND DAMS

Lakes are Formed by Landslides and Glaciers. We have learned in a former lesson that when basins among the mountains become filled with water from springs and brooks, they are called ponds, or lakes, according to their size. Any stream may form a lake if its channel is closed, as sometimes happens when masses of earth and rock slip down across the streams from the slopes of mountains. Such a fall of a portion of a mountain is called a landslide.

Sometimes mountain valleys contain glaciers, which bring down sand, gravel, and stones, scraped from the land over which they move. If such a glacier happens to cross another valley containing a stream, the load of earth is dropped in long ridges, which may dam up the stream and form a lake. Thousands of lakes in the northern part of the United States have been formed by glaciers, but in a manner different from the one here described. (See *page 119*).

The place where a lake overflows is called its **foot,** and the opposite and higher end of the lake is its **head.** The stream which carries away the overflow from the lake is called its **outlet,** and the small streams and rivers which flow into lakes are called **inlets.**

How Lakes Become Salt. Salt lakes are found in countries that have little or no rain. Such lakes may have many inlets, but they have no outlets. You have learned that the heat of the sun evaporates a great deal of water from the ocean, and from lakes and rivers. In dry countries, more water is taken out of the lakes by evaporation than flows into them from their inlets.

As we learned in Section III, the soil and the rocks everywhere on the earth contain minerals that are easily dissolved in water. The most abundant of these is salt. Therefore, when water soaks into the earth and flows out again in springs and brooks, it carries with it a small amount of salt, as well as other minerals; and when the water of a lake evaporates, the salt is left behind.

You may easily learn how this happens if you place a pan of salt water in the sun. In a few hours the sun will have evaporated all the water, and you will notice a thin crust of salt left on the sides and bottom of the pan. As the inlets of salt lakes are all the time bringing small amounts of salt, and as none ever goes out, the water becomes more and more salty.

Salt Water is Heavier than Fresh Water. If you weigh a quart of fresh water and a quart of water from a salt lake, or from the ocean, you will find that the salt water is heavier; and the more salt it contains the heavier it is. Objects float more easily in salt water than in fresh, because of its greater weight.

FIGURE 58. Twin Lakes, Connecticut. The Taconic Mountains are seen in the background.

Put a fresh egg into a basin of water, and observe that it sinks to the bottom. If, now, you dissolve salt in the water, the egg will rise to the surface. Perhaps you have read about the Dead Sea in Palestine, or the Great Salt Lake in Utah. If you should jump into either of these bodies of water, you would bob up like a cork and float on the surface. Many lakes are so salt that no fish or other creatures can live in them.

Ponds and Lakes are Useful and Afford Pleasure and Recreation. If you live near a lake, you can enjoy the pleasures of fishing, boating, and bathing in summer, and of skating and coasting in winter. Such bodies of fresh water furnish also supplies of water and ice for the people who live near them. Many of the larger lakes are well stocked with salmon, trout, white fish, bass, and other varieties of fish, and thus afford a supply of food, and profitable employment for fishermen.

FIGURE 59. A lake formed by melting ice, in a high valley among the Alps.

Some lakes are of great value for navigation. The five great lakes on the northern border of the United States are a part of the greatest waterway in the world, and are navigated by thousands of vessels, which carry grain, lumber, and iron ore from the more northern states to the manufacturing cities along the lake shores.

What Dams are Used For. All children like to build dams out of sod and stones. In this way ponds may be made, on which to float toy boats, and perhaps even deep enough to wade and bathe in. Men build dams across larger streams to obtain water power, and water for irrigation. Thousands of such dams have been built during the past few years to obtain power for making electricity. The electric current may be carried for many miles through copper wires, and is used for lighting the streets of cities, and for turning the wheels of factories.

Beavers Build Dams for their homes by gnawing down small trees in such a way that the trunks fall across some stream. Then they weave sticks and branches among the tree trunks, and make the dam tight with a coat of mud which they lay on with their broad tails. In the pond thus formed, the beavers build their houses. These houses project above the water, but the doors are at the bottom of the pond, and the inhabitants have to dive into the water when they wish to enter them.

DEFINITIONS

(1) **Ponds** and **Lakes** are bodies of water that occupy depressions in the land.
(2) A **Glacier** is a stream of ice flowing through a valley.
(3) The **Head** of a lake is its highest part.

FIGURE 60. Dam and power house on the Kennebec River.

(4) The **Foot** of a lake is the place where its outlet begins.
(5) An **Inlet** is a stream flowing into a lake.
(6) An **Outlet** is a stream flowing out of a lake.
(7) A **Dam** is a barrier closing the channel of a stream, or the lake formed by such barrier.

REVIEW. (1) Describe two ways in which lakes are formed. (2) Define the head, foot, outlet, and inlet of a lake. (3) Explain how lakes become salt. (4) Can you name any salt lakes? (5) How can you prove that salt water is heavier than fresh water? (6) Why is it easy to swim in salt water? (7) What sports may be enjoyed by those who live near a lake? (8) For what other things are lakes useful? (9) What is meant by a dam? (10) What important uses do men make of dams? (11) Tell how beavers build their dams.

OBSERVATION WORK. (1) If you h
helped to build a dam tell how it was done. (
was the head of it? (3) Why do dams sometim
(4) What damage may they do? (5) If you
made brine, tell how it is done. For what is br
How may you test its strength? (6) Write ab
visit that you have made to a pond or lake and
amused yourself there. (7) What plants do y
times find growing in the shallow places in ponds

SUPPLEMENTARY READING. *Payn*
graphical Nature Studies. *Dodge:* A Reader in
Geography, 113–116. *Chamberlain:* The Conti
their People, pp. 176–185. *Fairbanks:* Weste
States, pp. 95–140. *Chamberlain:* North
pp. 134–141. *Shaler:* First Book in Geology,
126. *Tarr:* New Physical Geography, Cha
Avebury: The Beauties of Nature, Chapter VIII

FIGURE 61. Beavers building a dam. A beaver house is seen in the right of the picture.

XII. THE FORMS OF WATER

All Water Returns to the Ocean. The vapor which rises from the ocean is carried over the land by the wind, in the form of clouds. When the clouds are cooled by meeting with cold air high above the earth, or around the tops of mountains, they are condensed into rain. The rain sin
the earth, or flows away into the
but is, at last, carried back to th
Thus, water is all the time traveli
the ocean to the land in the form o
and back again through streams to th

Hail and Snow. It sometimes happens that rain drops formed high above the earth, fall through layers of air cold enough to freeze them, so that they reach the earth

FIGURE 62. Snow crystals.

in rounded masses of ice called hail. Hailstones sometimes take on successive layers of ice in falling, and so have a series of coatings like an onion. They sometimes become as big as hens' eggs before they reach the earth.

When cloud vapor is condensed in air which is below the freezing point, the little drops expand into flakes of snow, somewhat as a grain of corn expands when it is popped. Snowflakes are found in many curious forms called **crystals.** Sometimes the snow partially melts before reaching the earth, and then we have a storm of sleet, or rain and snow mixed. Snowstorms are most frequent in high mountain regions, where the air is always cold. In such places, the snow becomes very deep, and masses of it slide off into the valleys, forming glaciers.

Dew and Frost. All air contains some vapor, but warm air holds more than cold air. When warm, moist air is cooled, it loses some of its vapor. At night the earth cools rapidly, and some of the vapor in the air gathers in little drops of dew upon the grass, leaves, and other objects. If the temperature is below the freezing point, the vapor condenses in the form of frost. On cloudy nights, very little dew is formed, because the clouds are like a warm blanket over the earth, and keep it from cooling enough to condense the vapor.

Fog and Mist. The vapor of the air sometimes condenses to form clouds near the earth. Such clouds we call fog, or mist. Often, in the early morning, we may see fogs creeping through the valleys, while the air on the neighboring hilltops is clear. Condensation takes place more quickly in the valley because the air contains more moisture than the higher air, and so loses it more easily.

Ice. When the temperature of water falls to 32°, ice is formed. This temperature is called the **freezing point.** On ponds and lakes, a coating of ice forms at the top of the water, because this part becomes cooler than the water below the surface. Often, when water freezes, crystals are formed, such as are seen upon the windows in winter. Ice crystals in the form of long needles are often found on the lower side of the ice formed on the ponds and lakes.

FIGURE 63. Appearance of a frozen bottle of milk. As the frozen milk expands, it rises out of the bottle.

When water changes into ice, it expands with great force. A cubic foot of water makes about one and one-seventh cubic feet of ice. Glass and earthen vessels are often shattered when water freezes in them. Rocks are broken apart when water freezes in their crevices. A tightly closed iron vessel filled with water may be broken if the water freezes solid.

Ice is lighter than water, and hence floats on the surface. If it were heavier than water, it would sink to the bottom, and during a long, cold winter, lakes would become solid masses of ice, and all living things in the water would perish.

DEFINITIONS:

(1) A **Cloud** is water vapor that has been cooled.
(2) **Hail** is frozen drops of rain.
(3) **Snow** is frozen water vapor.
(4) **Dew** is water that has condensed upon objects from the vapor in the air.
(5) **Frost** is vapor that has gathered upon objects cold enough to freeze and partly crystallize it.
(6) **Fog** or **Mist** is a cloud that touches the earth.

REVIEW. (1) Write the story of a raindrop that traveled from the ocean to the top of a mountain and then back to the ocean again. (2) How are hailstones formed? (3) What are snowflakes? (4) What is meant by sleet? (5) How is dew formed? Why is it not correct to say that dew "falls"? (6) What is frost? (7) What is fog, or mist? (8) Why does ice remain at the top of the water? (9) What would happen if ice were heavier than water?

OBSERVATION WORK. (1) On a cold day observe the mist that gathers on the windows. Why does it gather there? (2) What do you notice when you breathe against a cold window pane? (3) Have you ever seen "Jack Frost" pictures on the windows, and can you tell how they are made? (4) Notice the dew that is formed on a pitcher of ice water. Why is it formed? (5) In a cup of hot water, dissolve all the salt that you can; pour off the clear water into a clean glass, hang a few pieces of cord in the water, and then set the glass in a quiet place to cool over night. What do you then notice about the cords? Ask your teacher to tell you something about crystals. (6) Have you ever seen a pail of water or a bottle of milk which has been frozen solid? What did you notice about the ice or the frozen milk?

SUPPLEMENTARY READING. *Payne:* Geographical Nature Studies. *Murché:* Science Readers, Book III, Lessons 9, 10, 13, 14, 18. *Frye:* Brooks and Brook Basins, Chapter 7. *Fairbanks:* Home Geography, pp. 39–62. *Dodge:* A Reader in Physical Geography, pp. 81–109. *Chamberlain:* The Continents and their People, pp. 168–175. *Strong:* All the Year Round, Part II, pp. 88–102. *Andrews:* Stories Mother Nature told her Children.

XIII. LIFE IN CITY AND COUNTRY

Where People Make Their Homes. Animals and uncivilized men, lacking means of transportation, must make their homes where they can find food and the other necessaries of life; and when the supply of food becomes scanty in one place, they must move to another where it is more plentiful. Among civilized men, however, the choice of a home depends mainly upon one's occupation. The farmer must live in the country, the lumberman, near the forests, the miner, near the mines, and factory-workers and clerks, near the places where their work is done. In our country, most people have permanent homes, and seldom change them unless for a better opportunity to make a living.

The pioneers from New England moved into the West because the soil was richer and more productive. Many people go from the country to the city to find work or to engage in business, and every year thousands of people come to the United States from the countries of Europe, hoping to better their condition.

Country Life. More than half of the people of our country live on farms or in hamlets and villages. Farm life is quite

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HOW TO STUDY. This section and the following one treat of city and country life and the different occupations of men. These are important subjects for us, for every one must prepare to do some kind of work. Benjamin Franklin tells us in one of his letters, that when he became old enough to choose his life-work, his father took him about among the shops and showed him how the different trades were carried on, so that he might decide which he liked best. Benjamin was most attracted by the printing business, and so he became a printer — the best in America. It is a good plan to choose one's occupation early in life, so that we may better prepare ourselves for it. If you make your choice when you are in school, you will naturally be most interested in those studies which have to do with your future occupation, and if you are wide-awake and industrious you will gather so much information about it, that you will be able to make a living for yourself by the time you are ready to leave school.

FIGURE 64. A farm home in Minnesota; notice the location of the different buildings. For what is the windmill used?

different from life in a village or city. The houses are far apart, few people travel the country roads, and few strangers visit the small country villages. Many farmers drive to the village each day to "get the mail," to buy supplies at the village store, or to have work done at the blacksmith shop; but in some parts of the country, and in certain seasons of the year, days and even weeks pass without such trips.

Farm Life is Independent. The farmer does not have to go to the store or shop every day to buy food, as people do who live in cities. He has his own garden, potato patch, and corn field. He has all kinds of fruit trees; and apples, cherries, pears, and peaches are dried or canned for winter use. He may have berries in abundance from bushes which grow wild, or he may plant currant, gooseberry, or blackberry bushes near his house. His crop of vegetables, when gathered, may be stored in cellars or buried in the earth, and so kept until another crop is ready for use. The farmer has his own cattle, horses, sheep, and hogs. When he fattens his cattle and hogs for market, he usually preserves, by salting or smoking, some of the beef, pork, hams, and bacon for his own use. The farmer may take his own wheat, corn, or buckwheat to the mill and have it ground to supply

FIGURE 65. A haymaking scene. Notice the public road shaded with maple trees.

the house with flour. His dairy furnishes milk and butter and he has an abundance of eggs and poultry.

You will see, therefore, that the farmer could live a long time without going to the store at all. He has to buy coffee, tea, salt, sugar, and other *groceries*, but it is possible to get along without most of these things. Of course, he must have farming tools, and clothing for himself and family; but such things last a long time, and two or three trips a year to the village or neighboring city may keep him supplied. When the farm is at a considerable distance from stores, the farmer buys his supplies when he hauls his crops to market. The water supply on a farm is obtained from springs and wells, or water may be pumped from a neighboring brook or lake by means of a windmill, and stored in tanks and cisterns from which it is led into the house, or into the farm yard for watering the animals. If there is woodland on his farm, the farmer may furnish his own fuel; or he may be obliged to buy coal and kerosene for heating and lighting his house.

FIGURE 66. A country school.

Schools and Churches. Townships are usually divided into school districts, each of which maintains a school. The district school is located near the center of the school district, but some farmers may live a mile or more from the school, so that the children take their lunch with them and do not return home until the end of the afternoon session. A district school usually has from fifteen to thirty children of all ages, and as there is only one teacher, there must be many different classes, some of which may not have more than two or three pupils.

The schoolhouse usually consists of one large room fitted out with desks, blackboards, and wall maps for the study of geography. The village, if of moderate size, may have a graded school or a high school. The church is built in the village, or at some place convenient for the congregation. The minister is generally furnished with a house and garden near the church.

How Villages Grow into Cities. A good many years ago, in one of our Eastern states, a village stood at the intersection of two highways, and was therefore called "The Four Corners." A blacksmith shop had been built there so that the farmers in the neighborhood could easily have their horses shod and their farming implements repaired. The blacksmith employed a carpenter, who could repair wagons and carts or build new ones. Soon after the

FIGURE 67. The "Four Corners." A good place for a village to grow up.

blacksmith shop was started, a general store was opened, which kept all kinds of goods used by farmers. As soon as the community could afford it, a church was built, and a little later, a butcher and a shoemaker set up shops at "The Four Corners." The next step in the growth of the village was the building of a railroad through the township, and a station was established about a quarter

FIGURE 68. A business street in a city (San Francisco).

of a mile from the village. The station was called Millville, on account of an old grist mill standing at the falls in the creek, which flowed through the town. After a time this name was given to the entire village, and the old name was dropped.

The building of the railroad made a great change in Millville. Several men, who were employed by the railroad company, built houses near the station. A coal and lumber yard was kept by another man, who also bought hay, grain, and live stock from the farmers and sent them on the railroad to the city. By and by, a creamery and milk-bottling station was erected, which employed four or five men, who also settled at Millville.

It happened that strangers came to the town on business; and, moreover, there were several people who wanted a place to board. Accordingly, a hotel was built to accommodate visitors, and the proprietor kept horses and carriages for hire.

About this time, an iron ore mine was opened near by, and a blast furnace was built to make iron from the ore. This brought a hundred or more people to Millville. There was now enough business for a physician, a dentist, and a lawyer, and very soon these and other occupations were taken up by newcomers. Next, a village school and two new churches were built.

The water power furnished by the creek now began to attract the attention of manufacturers. Several companies combined to build a large dam, and a shoe factory and a chair factory were established. As the country about Millville was very productive of fruits and vegetables, a canning company set up a factory. This furnished employment to a number of people during the canning season, and made a good market for the farmers, who now began to raise large quantities of the fruits and vegetables to sell to the factory.

As each of the factories employed over a hundred people, the town soon grew so large that it was necessary to have a better supply of water than could be obtained from wells. A company of men, therefore, built a reservoir, which was kept filled with water pumped from the dam in the creek. A gas plant and a power house were now built to supply gas and electricity. As the machinery in the power house was run by water, the electricity could be supplied at a moderate price.

As Millville had now become a large village, a government was organized. A president, a water commissioner, and a street commissioner were elected, and two constables were chosen to keep order. These officers were paid by the people of the village. Many new streets were laid out, and sidewalks were built along all streets where there were houses. Sewers were constructed to carry off the waste water, and men with carts were employed to keep the streets free from garbage and refuse.

Most villages and cities have grown up in

much the same way as Millville. Some have been helped by fertile soil, by mines, or by forests, or other forms of natural wealth, and all, by good means of transportation.

City Homes and Streets. We shall now notice some ways in which city life is different from country life. In the first place, most country homes have plenty of space around them. They have gardens for fruits and flowers, and lawns where children may amuse themselves. Country homes usually stand some distance from the road, so that there is plenty of room for planting shade trees. In the city, where houses are close together, there is no room for gardens or lawns. Country homes have seldom more than two or three floors, because there is room to build them as long and as wide as one wishes; but in the city where land is scarce and valuable, many dwelling houses are five or six stories in height, and in some cases, much higher, so that a dozen or more families may live in the same house.

FIGURE 69. A residential section of a city (San Francisco).

The streets of cities, unlike country roads, are paved with stone to avoid the unpleasantness of dust and mud where so many people are passing. The rain water is drained away through pipes and sewers laid under the streets. If it were allowed to run away on the surface, many streets would become raging torrents of water during a heavy rain, and could not be crossed by people on foot.

In the country, a man may build his house in any place or in any manner that suits him. But in the city, the government makes rules about buildings, which every one must follow. Houses must stand a certain distance from the street; they must be built so that plenty of air and light may enter, and of brick, stone, or other materials which do not take fire easily.

Until recently, little attention was given to laying out country roads and keeping them clean and in order; but the streets of cities are carefully laid out by surveyors. They must have a certain width, and must be graded so that water will run off. They must be paved, lighted, and kept clean, and rules are made as to what kind of vehicles may drive through them.

FIGURE 70. Lake and boathouse in a city park.

Parks and Pleasure Grounds. Country children have green fields and meadows where they can romp and play. They can bathe and fish in the brooks and lakes, and they can have many picnics and nutting parties in the woods. In the city, parks, gardens, and playgrounds are provided, where people may go to rest, and to enjoy the fresh air and scenery.

Most parks in our cities are made beautiful by laying out walks and drives, and by planting trees and flowers. They may have fountains, lakes, and brooks, whose water is often brought from a distance. Some parks have ball grounds, tennis courts, and meadows, where picnics and May parties may be held. If the park happens to be near the water, there will be bathing, boating, and fishing. For the amusement of children, many playgrounds in the parks are fitted with swings, see-saws, merry-go-rounds, and other devices for exercise and pleasure.

Schools and Libraries. The country school may have only one room, one teacher, and twenty or thirty pupils; but city schools are often built from three to five stories high, with fifty or more rooms, where several thousand children may be seated at one time. There are so many children in some cities, that the schools are only a few blocks apart, and no one has to walk far to reach one.

Many cities furnish, free of charge, all the books, paper, and other school supplies needed. Officers are appointed to see that good teachers are employed, and that the children are taught the things which they need most to learn. City schools are so graded that all pupils of nearly the same age may be taught in the same class. There are elementary schools, high schools, colleges, and trade and training schools, so that pupils may advance from one to another, and become fitted for some kind of work when they are through with school life. You will see therefore that it costs a great deal of money to build the schools of a city and keep them running.

In the country, there are small libraries in the larger villages, and some schools and churches also have small collections of books. But in the city, there is always a large library where we may go to study any books that we need, besides circulating libraries, from which we may draw books to take home. In large cities, one may find libraries for law students, medical students, and for others who are preparing to follow one of the professions. The means of getting an education are usually much better in the city than in the country.

Shops and Stores. We have learned that the farmer can provide himself with most of the food needed for his family; in the city, however, everything one needs must be bought, and a great many people therefore must be shop-keepers and store-keepers. Most of the stores in the city are grouped together in certain streets called business streets. This is especially true of the larger retail stores, and of those that sell goods only in large quantities, or at *wholesale*. In order that the people need not go too far to purchase the necessaries of life, stores, meat markets, and bakeries may always be found within a block or two. As many people in the city do not take all their meals at home there must also be restaurants and lunch places where food is served. People in the city usually have no place to store a large supply of food and must buy each day what they require.

Travel and Transportation in the City. In the country, nearly every one has horses and wagons to use for business or pleasure. If the country merchant wishes to visit the city he drives to the station and takes a train, or if he lives near a river he may go on a boat. Most people living in a city cannot keep horses and wagons, as it would be too expensive. Neither can they hire them whenever they wish to go from one part of the city to another. Many people in the city live a long distance from the stores or offices in which they work, and as they cannot walk so far, they must have some cheap way of traveling. This is accomplished by laying tracks on which cars are run through some of the streets. The companies that own these car lines, can afford to carry people for a very small sum because so many use the cars.

In some of our larger cities, where the streets are crowded, the car tracks are laid underground, or on a track built high above the streets. The underground railways are called **subways,** and those built above the ground **elevated** roads. Cars may run through tunnels built under rivers, or on bridges built over them. Some of the rivers are crossed by ferryboats, which carry passengers for a small fare. Besides cars and boats, we have carriages, cabs, and automobiles, for hire. These may be found at different stations in the city.

People and vehicles of every sort are all the time passing through the streets of a busy city. People walk much more in the city than in the country, and the sidewalks of the business streets, especially, are often crowded. Many wagons belonging to stores and express companies carry goods from one part of the city to another. On residence streets and in the parks, people ride and drive for pleasure. All of this is quite different from the country, where you may see not more than a dozen people in a whole day, and few carriages or wagons.

Policemen and Firemen. There are always some people who are disorderly and vicious, and the city is the favorite home of thieves and criminals of all kinds. They can easily keep themselves hidden in the city, but in the country this would be impossible. If there were not some one to guard us from these dangerous persons, honest people would not be safe in their homes and places of business. Therefore, in every city, policemen are employed to keep order and to arrest anyone who is guilty of a crime. If property is stolen or other crimes committed, the police try to bring the offenders to justice. The policemen patrol the streets at night, and may be called on at any time by citizens to protect them from danger. Policemen are also stationed at the street corners to regulate traffic and make it safe for people to cross.

It is just as necessary to have firemen as policemen. If fire breaks out in a city, it does great damage unless put out at once. So, in different parts of our cities we have fire houses where engines, ladders, and hose carriages are kept. The firemen sleep in the fire house, and are ready to drive to a fire at a minute's notice. On the street corners and in other places, there are fire hydrants which supply water for putting out fires. Every city has a system of fire alarms. The alarm boxes are placed at the street corners or in large buildings where anyone may obtain the key and send in an

FIGURE 71. Trucks receiving and delivering goods along the waterfront in New York City.

alarm of fire. When the alarm rings in the engine house, the firemen rush to the place where the fire is. They put up their ladders and see that everyone is out of the burning building. The hose is attached to the fire hydrant and streams of water are poured upon the fire until it is extinguished. The fire engines and carriages are usually drawn by horses, which are very intelligent, and understand their duties almost as well as the men. But nowadays, in many large cities, automobile engines are taking the place of horses.

The work of a fireman is dangerous. He may be killed by falling walls or by stifling smoke. He must be brave and active, and must know what to do in time of danger.

Many people have been saved from death by brave firemen.

Just as we must have a man at the head of the police force, we must have one or more men to look after the fire department. It is their duty to provide everything needed to put out fires, and to make rules which the firemen must follow. The fire department is a part of the city government, and all the men employed in it are paid by the city.

REVIEW. (1) How do people choose a place for a home? (2) Why do men and animals sometimes change their homes? (3) How many of our people live in the city? (4) Compare a city street with a country road. (5) Name some of the things that the farmer can provide for himself. (6) Why is a farmer more independent than a person living in the city? (7) Where do the people living in the city get supplies of food? (8) What things must the farmer buy at the store? (9) How is water obtained in the country? (10) How is it provided in the city? (11) Compare a country school with a city school. (12) Write a story about the growth of Millville. (13) Compare city homes with country homes. (14) Why are parks needed in the city? (15) Describe some of the amusements that may be enjoyed in a park. (16) Write a paragraph about amusements in the country. (17) Why are so many stores needed in the city? (18) What stores are found only in the business parts of a city? (19) What kinds of stores are found on nearly every street? (20) Write something about "Travel in the City." (21) Write something about "Travel in the Country." (22) Why do you find so many people walking in the city, and so few in the country? (23) Why are policemen and firemen needed in the city? (24) Write all the reasons why you would like to live in the country; or, all the reasons why you would like to live in the city.

SUPPLEMENTARY READING. *Niver:* Stories of the Farm. *Carpenter:* Geographical Reader, pp. 361–371. *Sidgwick:* (Peeps at Many Lands), Germany, pp. 46–51. *Lyde:* Man and his Markets. *Lane:* Toward the Rising Sun, pp. 29–35. *Fairbanks:* Home Geography, pp. 189–212. *Miller and Davis:* Geography of New York City. *Parker and Helm:* Uncle Robert's Geography, Book III, Chapter 11.

XIV. OCCUPATIONS

Men Labor to Supply Our Wants. Wherever we go we find people doing some kind of work. In the country we see farmers raising crops of grain and fruit, tending vegetable gardens, and caring for their flocks and herds. In the village we find the storekeeper, the carpenter, the blacksmith, and other mechanics working at their trades. At the railway station, the express office, and the post office, we see men handling boxes, packages, and letters which are to be sent away to other places or delivered to people living in the neighborhood.

FIGURE 72. Indians spearing salmon along the Columbia River.

City Occupations are Varied. In the city, people are engaged in a still greater variety of occupations. While there are some stores which handle all kinds of goods, as in the country, we find also a vast number of stores which deal in only one kind, as dry goods, groceries, shoes, stationery, clothing, hardware, fruit, fish, or meat. The city is also the favorite location for mills and factories. Our largest cities support hundreds of different manufacturing industries; but many of the smaller cities have only one leading industry, as for example, shoes, gloves, cottons, woolens, silk, iron and steel, etc., as we shall see when we come to study the different countries and cities.

Occupations Among Uncivilized People. Among savage or barbarous people the chief occupations are hunting, fishing, and herding. When the Eskimo needs a boat, a house, a spear, or a fishhook, he makes it. The women make their own needles and thread, and with them they sew together the skins of animals for clothing. They have no stores and no factories, for every man is his own storekeeper and his own manufacturer.

The Arabs, about whom we read in a former lesson, are in the barbarous state of life. We found that they have herds of camels, goats, and sheep, and that they raise small crops of grain. They make their own clothing, shoes, and whatever utensils they need in their tents. Occasionally they exchange goods with the caravans, but they have no regular way of getting the necessities of life by means of trade.

Pioneer Life. Sometimes civilized people go to live in new or unsettled countries. As they cannot take many things with them, they have to live for a time in the same manner as the Eskimos or the people of the desert. The early settlers in America came from their homes in Europe to live in a land covered with forests and inhabited by savage tribes of Indians. They built their settlements along the coast, and made occasional voyages to the mother-country, from which they obtained whatever they needed until they could make it for themselves. Their furniture, clothing, and farming tools, and even some of the materials for building their homes were brought across the ocean.

But those who journeyed far out into the wilderness had to depend entirely on themselves. The corn which they raised, they pounded into meal to make bread. The women spun the wool from the sheep and wove the thread into cloth. For a long time their clothing was made chiefly from homespun wool and from deer-skin.

Their children were taught at home from the books which their parents had brought with them; their pens were made of goose quills, their ink from the colored juices of certain plants, their pencils from charcoal or lead, and they wrote on birch bark or smooth pieces of board. For many years little attention was given to education, as so much work had to be done to obtain even the necessaries of life.

Where many settlers lived together, they employed a minister and a schoolmaster; but the pioneers who pushed far out into the wilderness had neither schools nor churches.

How the New Settlements Grew. As soon as these pioneers were able to raise a little more grain than they needed, they began to look about for some means of exchanging it for guns, ammunition, clothing, coffee, tea, and farm tools. They also had plenty of deer-skins, which would bring a good price in the towns along the coast.

Sometimes traders from the eastern cities would take goods to the frontier and exchange them with the pioneers for their furs and skins. Little progress was made in trade, however, until roads had been cut through the forests. Then the farmer could haul his goods to the river and send them to the coast on a flat-boat. But carrying goods over a rough forest road and on a flat-boat was slow and expensive, and it was not until better roads were built and canals were dug, that the new country began to make rapid progress. The building of the Erie Canal between the Hudson River and the Great Lakes made a good waterway between the eastern coast and the rich farming country where the pioneers lived, and brought about a rapid growth of all kinds of industries. It has taken over a hundred years, however, to change the western wilderness into productive farms and great cities.

How Work is Divided. As population increases and villages and cities grow, each man usually chooses some particular kind of

work that he likes best, or that he can do better than his neighbor. The kind of work that he does depends also upon the opportunity which he has for obtaining materials and for selling the thing that he makes. Because everyone must have food, clothing, and shelter, there are more people engaged in supplying these needs than in other kinds of labor.

House Building. Not many years ago, any one who wished to build a house employed a carpenter. This carpenter and his assistants planned and built the entire house; but to-day,

FIGURE 73. A hunter's camp in the Maine woods.

when we build a house, we usually employ first, an architect to draw the plans. The work of digging the cellar is given to one man, the building of the walls requires bricklayers and helpers. The gas-fitter, the electrician, the steam-fitter, and the plumber provide for lighting and heating the house, and for supplying it with gas and water. We must have a plasterer to make the inner walls, and a decorator and paper-hanger to cover them. We may have a special workman to make the roof and another to put in the windows. We must have a painter to paint the house and perhaps various other people must inspect and approve it before it can be occupied.

Skilled Labor. What is true of house building may be said about the work in our factories. Each article produced requires the labor of many hands. There are no less than a dozen operations required in making so simple an article as a steel pen, a needle, or a knife blade. In making clothing, shoes, or hats, there are a number of processes, each of which requires a different workman. By thus dividing up the labor, each workman becomes more skilful, and better and cheaper articles are obtained.

Hunting and Fishing. In every land where fish and game abound, there are many men engaged in hunting and fishing. We have seen that savage people get their entire supply of food in this way. The best fisheries are in the shallow waters near the coasts and in the large lakes and rivers. Fresh fish are packed in ice and shipped to distant markets, and great quantities are salted, dried, or canned, so that they may be sent to any part of the world.

Hunting and trapping are occupations which employ a small number of people who live in forests and in other unsettled regions. A few animals like the deer and the moose are hunted for their flesh. A far greater number of small animals are sought for their fur. These fur-bearing animals have their homes chiefly in the cold parts of North America, Europe, and Asia. The ostrich is hunted for its feathers and the elephant for its ivory tusks. In civilized lands many men hunt and fish for sport.

Farming Gives Employment to Many People. More people are engaged in tilling the soil than in any other occupation. The cultivation of the soil is called agriculture, or farming. It includes not only the growing of farm crops but also gardening and fruit-growing. Agriculture requires more knowledge, skill, and labor than grazing, and is carried on extensively only in civilized countries. As a rule, the farmer raises not only the usual field crops, but he has gardens, orchards, and live stock. His life, therefore, is a busy one. During the spring he prepares the soil by plowing the ground,

and making it smooth and mellow. The gardens and fields are then planted. The fruit trees and vines must be pruned and trained, and the soil about the roots made fertile. Some of the growing crops, as cotton, corn, and vegetables, must be cultivated and kept free from weeds.

Destructive insects must be removed from fruit trees, and the growing crops must be protected, not only against insects, but in many cases from frost or drouth. If the farmer has a dairy, the animals require careful attention in order that they may be profitable.

FIGURE 74. An apple orchard in full bloom in the Grand River Valley, Colorado.

During the late summer and the autumn, the crops must be harvested and carried to market. Fruit must be gathered, packed, and shipped; and perhaps the soil is plowed for the next crop. Besides attending to his crops and farm animals, the farmer must keep his fences, buildings, and farm implements in repair, and he must study the best methods for fertilizing the soil and managing his farm.

Special Farming. In some of our states, there are large farms and extensive grazing regions where only one kind of work is done. Thousands of acres may be planted with wheat or corn, no other crops being raised. A man may have a ranch and devote all his time to the care of his sheep or cattle. Near large cities, there are farmers who raise vegetables and fruits for the city markets. In parts of New York, Delaware, Michigan, New Jersey, and other states, there are large fruit farms given entirely to raising peaches, g or other fruits. There are many poultry which produce only eggs and poultry, there are dairy farms which produce butter, and cheese.

Quarrying and Mining. The earth storehouse of useful minerals. What w we do without building-stone, iron, copper, salt, and other minerals and m of which we make use in daily li

Gold, silver, copper, and lea found deep in the earth and ar tained by mining. Quarrie granite, marble, limestone, and of clay are found in very mar our states, but mining is a le occupation in the mountain re of the country. Coal is foun layers, some of which are nea surface; but some coal mines several hundred feet deep. Iron most useful metal, is found nea surface of the ground.

The Value of Our Manufact The products of the farm, the mine quarry, and the forest must be made

FIGURE 75. A limestone quarry at Rockland, M

useful articles, and some manufacturi done in every country. Hats, shoes, clot tools, and weapons are made by all races. carpenter, blacksmith, and tailor are m facturers on a small scale; but in civilized countries the greater part of manufacturing is done in large estal

ments called **factories,** which are built chiefly in the large towns or cities. We have only to look about us to see how dependent we are on the factory. Our clothing, shoes, hats, and gloves are now made in factories; our furniture, carpets, and all utensils used in the home are made in factories. In factories, too, are made wagons, plows, reapers, mowers, and other machinery used by the farmer.

Besides these things, our factories and mills make a great variety of machinery of every sort, such as electrical machinery, automobiles, steam engines, and machinery for spinning and weaving cloth, and for working metals. The advantage of making articles in a factory is that they can be made cheaper and better than when made at home. We have seen that when one man devotes all his attention to doing a single thing, he becomes more skilful and often finds out new and better ways of doing his work. So it happens that men employed in the mill and factories have invented many new machines, by means of which they can make the things that we need more cheaply.

Why Transportation and Commerce are Necessary. In order that all of us may be supplied with the things we need, there must be some way of carrying goods from place to place. This work we call transportation. Without means of transportation, we could not carry on trade with the different states and countries.

The farmer can take his own grain and cattle to market and bring back to his home the provisions and supplies which he needs to carry on his farm work; but many things which he buys at the village store have been brought from distant places by railroad and steamship. The lumber for his wagons and furniture may have been brought from the forests of Michigan, Oregon, or Georgia, or even from a foreign country. The flour may have been made from wheat raised in the fields of Minnesota, and the goods for his clothing were probably made in the mills of New England or brought across the ocean from Europe.

Methods of Transportation. Trade is so important in all countries that we find everywhere some means of carrying goods from place to place. In Africa, and in some mountainous countries, men are employed to carry goods on their backs. Horses, donkeys, camels, and reindeer are used in many lands; the dog pulls the Eskimo's sledge, and in various countries, the yak, the buf-

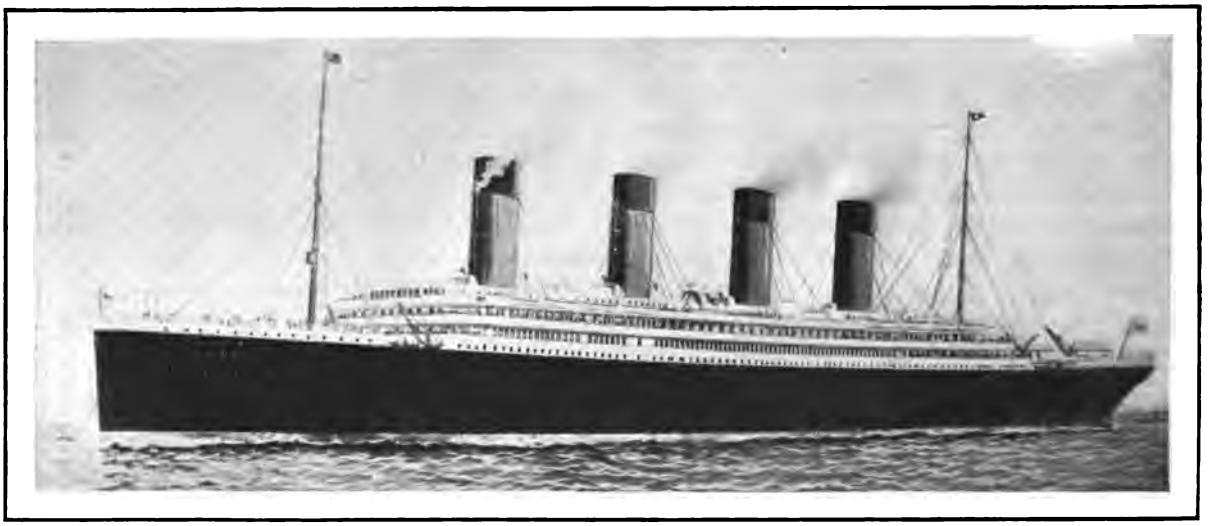


FIGURE 76. An ocean steamship nearly 900 feet long and carrying nearly 50,000 tons.

falo, or the llama are used as beasts of burden.

The most common method of transportation and the one used by the greatest number of people is by means of carts and wagons on the public highway, or road. Nearly

FIGURE 77. A fifty-car train carrying fifty-five thousand bushels of wheat on the Canadian Northern Railway.

all the products of the farm *begin* their journey in this way. When they reach the railway station or the steamboat dock, they are carried by rail or boat to the city market or to the flour mills, cotton mills, or other manufacturing establishments. After these materials have been manufactured, they begin another, and sometimes a longer journey, because some of the products are carried to distant parts of the world.

In civilized countries, the railroad has become the most important means of transportation. Railroads are now built over mountains and rivers as well as on level ground. As trains can run at all times of the year, transportation is not interrupted, while rivers and harbors may freeze during the winter, or the rivers may become shallow in time of drouth.

Steamships and sailing vessels are the only means of crossing the oceans to carry on trade with distant countries. Navigable rivers and canals are of great value to commercial countries, as goods can be carried more cheaply by water than by any other method.

Means of Communication. In business it is very important to be able to communicate quickly with people living at a distance. The chief means of communication is the postal service, which, in most countries, is managed by the government. It requires more than a week to send a message by letter from New York to San Francisco and get a reply, but an answer to a telegram can be received within a few hours. By means of the telephone we can converse with people who are hundreds of miles away.

The merchant orders goods from London or Paris by a cablegram, and thus saves a week in getting them. By means of the wireless telegraph, communication may be had with vessels hundreds of miles out on the ocean. A vessel in distress may call other vessels to its aid and save hundreds of lives.

Other Occupations. Farming, manufacturing, mining, and commerce employ the greater number of people. One large department store may employ many thousands of people, and one factory a still larger

FIGURE 78. Lumbering scene. The logs are piled along the rivers and floated down to the mills where they are made into lumber.

number. Think of the number of people employed in the postal service, and by the railroad companies! Then there are lawyers, doctors, clergymen, teachers, artists, authors, engineers, and a host of others who perform work which requires special knowledge and skill.

Many thousands of people find employment in the service of the government in

our cities, our states, and nation. About 100,000 persons are employed by our government in foreign countries, and over 200,000 in our army and navy.

Location of Industries. The kind of work that people do depends upon the opportunities offered by the place in which they live. Men usually follow the occupations that *pay* them best. Where the soil is fertile and there is plenty of rain and sunshine, the chief occupation is farming. In places where the earth is stored with minerals the leading occupation is mining.

In cities we find many merchants, because the city offers the best opportunities for buying and selling. Along the seacoast men are engaged in fishing or in trade. Factories are usually built where there are good transportation facilities, and where power, labor, and raw materials can easily be obtained. We find many cotton mills built near the cotton fields, flour mills near the wheat fields, and lumber mills near the forests. In places where coal and iron abound, furnaces and mills for making iron and steel goods are located. As a rule, the city is the best location for factories because it can furnish many laborers and the best means for marketing and transporting goods.

REVIEW. (1) Describe the work of the farmer and the gardener. (2) Name some occupations followed in villages; in cities. (3) Why do we find fewer occupations in savage or newly settled countries? (4) Describe the life of the natives of central Africa, and compare it with the life of a pioneer. (5) Why is it better to have many occupations than to have one person do everything? (6) Name the different persons that may take part in building a house. (7) How is labor divided in our factories? (8) What is said of hunting and fishing? (9) Name some animals which are hunted for their furs. (10) What other animals are hunted? (11) What does farming include? (12) Describe the work of the farmer who carries on many kinds of work. (13) Describe farms that carry on only one kind of work. (14) Name some useful minerals and tell how each is obtained. (15) What is meant by manufacturing? (16) Name some articles in common use which are manufactured. (17) Tell from what materials these articles are made. (18) Why are means of transportation necessary? (19) Mention the different methods of transportation and tell something about the usefulness of each method. (20) What is the advantage of the telegraph and the telephone? (21) What is said about professions? (22) Can you name a class of people employed by the government? (23) What may be said of the location of industries?

OBSERVATION WORK. (1) What are some of the occupations of the people living near your home? Describe some kind of manufacturing which you have seen. (2) What kind of road is in front of your house? (3) What use is made of this road? (4) Describe a visit to a railway station. (5) Describe a visit to a mine or a factory. (6) What have you observed about the work of the Post Office Department, a telegraph office, or a telephone exchange? (7) What persons have you seen engaged in producing materials used in factories? (8) Watch the construction of a house or other building, and notice the different workmen that take part in it. (9) What can you tell about transportation in the city or in the country? If you live near a river, a canal, or near the ocean, tell what kind of transportation you have seen carried on there.

SUPPLEMENTARY READING. *Chase and Clow:* Stories of Industry, Volumes I and II. *Allen:* Industrial Studies. *Carpenter:* How the World is Fed, How the World is Clothed, How the World is Housed. *Chamberlain:* How We are Fed, How We are Clothed, How We are Sheltered, How We Travel. *Rocheleau:* Great American Industries. *Payne:* Geographical Nature Studies, pp. 102–127.

XV. GOVERNMENT

The Need of Government. When boys play foot-ball or base-ball, they play according to the rules which have been made for those games. They choose an umpire, whose business it is to see that every player follows the rules. In these games as well as in other games the players may make the rules by which all are governed, and if any player will not obey the rules, he is not allowed in the game.

Having rules which everyone must obey, and some one to enforce the rules, is what is meant by government. There are, of course, many ways of making and enforcing rules.

Government is needed in the family, the school, and in any kind of business where a number of people work together; and just as in the game of base-ball, there must be some one to do the governing. The parents govern the family, the teachers govern the school, and the superintendent or manager governs business enterprises. Sometimes the same person makes the rules and enforces them, as in the case of the family.

The rules for carrying on our schools are made by the school trustees, the school board of the city or the state, or by the teachers and principals who are chosen to enforce them. In the government of our towns, counties, states, cities, and of the whole country, the voters choose certain persons to make the rules, or *laws*, and other persons to enforce them.

Voting and Elections. If you are a member of a ball team or of a society or club, you can tell how the captain, or how the club officers are elected. One way is for each member to write on a slip of paper the name of the one he thinks best fitted for the position. These slips of paper, or ballots, are dropped into a hat or a box, and are counted by one or two persons chosen for that purpose. The one who receives the most votes is declared elected.

Another way of holding an election is to allow anyone to name, or *nominate*, some person for the position. Perhaps several persons may be nominated in this way. The persons nominated are called candidates, and the members then vote for these candidates by writing their names on ballots, or by voting in some other way.

When we elect officers to govern our cities and states, the candidates are first nominated by the voters belonging to each political party. The nominations are made at a meeting called a **primary**. The names of the candidates are then printed on a ballot, and on election day each voter marks a ballot so that it shows the persons for whom he wishes to vote. ballots are placed in a box and are afterw counted. The candidates having the gre number of votes are said to be elected.

Units of Government. In our cou there are many political divisions, and voters living in each division govern th selves in matters which concern them al The smallest political division is the sc district, where the voters meet to school officers, such as trustees or direc a tax collector and other local officers, a collector, and to decide how much m shall be raised for school purposes, what pairs be n in build

FIGURE 79. The Capitol at Washington, and the White H or residence of the President of the United States.

As such matters are of interest only to people living in the school district, we call t local matters. And because the people th selves do the governing, we call such governi local self-government.

The voters living in a town, vill county, city, state, or other unit of gov ment have the power to choose their officers and to raise money for certain poses. The voters of the township ch one or more men called supervisors,

selectmen, who are at the head of affairs. They choose also a clerk, a collector of taxes, constables, justices of the peace, a road commissioner, and other officers.

The voters of a city choose a mayor, a board of aldermen, and other officers. In the state, the voters elect a legislature to make laws, and a governor to carry them out. Every two years the voters of the entire country elect a Congress to make laws, and every four years they choose a President to enforce these laws.

In every unit of government there is a place selected where the officials meet to transact business. In the town, this place is called the town hall, and in the city, the city hall. In each state, some city is chosen as the capital city, and the capital city for the United States is Washington. In each capital city a building, called the capitol, is erected where the officers of the government may meet. There may be other buildings also which are used for different branches of the government.

FIGURE 80. The custom house, New York City, where business connected with our foreign trade is transacted.

The People May Choose Representatives. In villages, country townships, and in school districts, all the voters can meet together to carry on the business of government: but in large cities, and in the state and nation, it would be impossible to do this. Therefore, we divide the states into districts, and the voters in each district elect a Member of Congress. All the voters of each state elect also two senators, and these ninety-six senators form the Senate, one of the Houses of Congress. The representatives from the congressional districts form the other house, which we call the House of Representatives.

Each state is also divided into smaller districts called assembly districts and senatorial districts; and the voters of these districts elect the members of the state legislature. The kind of government where people govern themselves through their representatives is called representative government.

The Powers of Government. The officials whom we choose to govern us, can make laws about those things only which concern all the people alike. They cannot make rules about any one's private business. A farmer must manage his farm in his own way.

But there are some things in which all the people are interested alike. All wish to have good roads and streets; all wish their lives and property to be safe from criminals, and to have good public schools. If a town wishes to lay out a new road or a city a new street, the officers of the town or of the city are given the power to do it. If the people of the state wish to build a railroad or a canal, the matter is entrusted to the officers of the state government.

The people of the state build prisons where criminals are confined, and asylums and hospitals where insane people and those suffering from certain diseases are cared for. The state legislature makes laws for the government of cities, towns, and villages, and concerning horse racing, gambling, and the sale of intoxicating liquors.

Powers of the National Government. The National Government has charge of all the rivers, railroads, and canals which lead from one state to another. It sometimes fixes the amount of money that shall be charged for carrying passengers and

freight, and makes other rules about the management of trade and transportation among the states.

The National Government takes care of the harbors of the country, and has charts made of the coasts for the guidance of sailors; it builds light-houses and displays signals to warn ships of dangerous places or of the approach of storms. It also makes rules about trade with foreign countries. **Custom houses** are built at certain seaports where foreign goods are brought in, and a tax or duty is collected on some of them to help support the government.

FIGURE 81. The state capitol at Harrisburg, Pennsylvania.

The National Government carries on the post-office department by establishing offices in every city and village, and by employing men to carry the mail. It also has charge of the army, the navy, and a vast amount of public property consisting of mines, quarries, forests, lands, docks, forts, and buildings. The National Government also sends a man called a **minister** or **ambassador** to live at the capital of each foreign country, to represent our government and to transact any business between the two countries. Other officers called **consuls** are sent to important foreign cities to look after the interests of our merchants and to protect Americans traveling abroad.

The Divisions of Government. The powers of government are usually divided into three classes, which we call the **Legislative,** the **Executive,** and the **Judicial.** The word legislative means lawmaking, and the group of people who make the laws are usually called a legislature, but many other terms are used.

We have learned that the National Legislature is called the Congress, and that the city legislature is called the Board of Aldermen, Council, or some other appropriate name. The county legislature is called the County Commissioners or the Board of Supervisors.

The executive department usually consists of a single person. If there were several executives, they might not agree as to what should be done, and then the laws would not be carried into effect promptly. The chief executive of the United States is the **President,** and that of a state is the **Governor.** The executive officer of a city is the **Mayor,** of a village, the **President,** and of a township, the **Supervisor,** or similar officer.

The judicial department consists of judges, who decide disputes about the laws. The place where a judge presides is called a **court;** and any person who thinks he has been unjustly deprived of his liberty, property, or privileges, may bring his complaint into court before a judge, and the person who has injured him may be punished if found guilty.

Different Kinds of Government. In a few countries the officials are chosen by the king or other ruler, who is the head of the government. Such a government is called an **absolute monarchy.** In our country and in most other countries, the officials are chosen by the people themselves, or are appointed by those who represent the people. Such a form of government is called a **republic.** We sometimes call our

FIGURE 82. The first President of the United States.

government **a democracy,** a word meaning *government by the people,* but a true democracy is a form of government where all the people actually meet together to make laws.

In most countries where the chief ruler is a king or emperor, the people elect a legislature which helps to make the laws. We call such a government **a limited monarchy.** But there are some countries, such as England, where the King has very little power. The English people make laws through their representatives in the same manner as the people of the United States.

There is still another kind of government called **tribal government,** because the people of the tribe meet together to elect a chief and to make laws. Tribal government is really a kind of democracy.

REVIEW. (1) Why is government needed? (2) Name some things that can be done better by the government than by each person for himself. (3) Describe the methods of voting. (4) Name the different units of government in which you live. (5) Why is it necessary for people to choose representatives to make laws? (6) What work is done by the legislatures? (7) Name several kinds of legislatures. (8) What are the duties of the executive department? (9) What are the executives of the different units of government called? (10) What are the duties of a judge? (11) Name some of the duties of the national government. (12) Name some of the duties of the state government and of the local governments.

OBSERVATION WORK. (1) Tell how the officers are elected in some society to which you belong, such as a club or a Sunday school. What are the officers called? (2) Find out how officers are elected in the town, village, or city in which you live. Find out what they are called and what their duties are. (3) Examine a ballot that is used on election day. What political parties have the names of their candidates on it? (4) Are the candidates running for national, state, or local offices? (5) Find out the name of some official in your town or city who is appointed by the president and tell what he has to do. Where does he conduct his business? (6) What form of government is a state government? City government? Town government? (7) Name any property in your vicinity which belongs to the United States Government. (8) What use is made of this property? (9) Tell something that the state does for the people living in it; something that the town, village, or city does for its citizens. (10) Do you think that election day should be a holiday? Why? (11) Why ought you to obey the laws of the place where you live? (12) Give the name of the president; of the governor of your state; of the mayor of your city; of the congressman of your district. (13) Give the name of any other public officer that you know. (14) What are his duties?

SUPPLEMENTARY READING. *Payne:* Geographical Nature Studies, pp. 140–142. *Lyde:* Man and his Work, pp. 125–128. *Winslow:* The United States, pp. 17–21. *King:* The Picturesque Geographical Readers, Third Book, pp. 215–232.

XVI. DIRECTION, DISTANCE, AND MAPS

Ways of Finding Direction. We have learned how to tell east and west by noticing where the sun rises and sets; and we can find north and south by observing the position of the sun at noon. On a clear night, we may find the North Star by means of the "Pointers," or two stars which form the outer edge of the bowl of the group of stars called the Great Bear, or Dipper. When we are facing the North Star, south is behind us, east is on our right hand, and west on our left hand.

The Compass. Sailors also may tell direction by observing the North Star and

the sun; but in steering their ships, they generally make use of the compass. This instrument consists of a piece of steel called **a needle,** mounted on a pivot so that it will turn easily. Such a needle when **magnetized** will point north and south.

Take a few sewing needles and draw each

FIGURE 83. Finding the North Star.

one a few times across the end of a magnet; then thrust each needle through a small piece of cork and float the pieces in a pan of water. The needles will turn slowly about until all of them point north and south. These magnetized needles behave in the same way as the needle of a compass, which is, as we have said, a magnetized needle.

Beneath the needle of the compass is placed a card on which the different directions are marked. North, east, south, and west are called the **cardinal** points. Northeast, southeast, northwest, and southwest, are half-way between the cardinal points and are called the **semi-cardinal** points.

To use the compass, place it on a level surface and turn the box slowly until the north mark on the card is directly under the north end of the needle; you can easily tell the north end because it has an arrow-shaped point like the hand of a clock. On shipboard, the compass is mounted in such a way that it will always be level, no matter in which direction the ship may roll.

Measuring Distances. We have learned how to use a foot rule, a yard-stick, or a tape-measure, in measuring short distances. These measures are divided into inches, half-inches, quarter-inches, and eighth-inches. In measuring longer distances, we sometimes "pace it off." A man usually steps about three feet, and such a step is a **pace.** Five paces make about one rod. The farmer sometimes measures his fields by pacing the length and breadth. Then

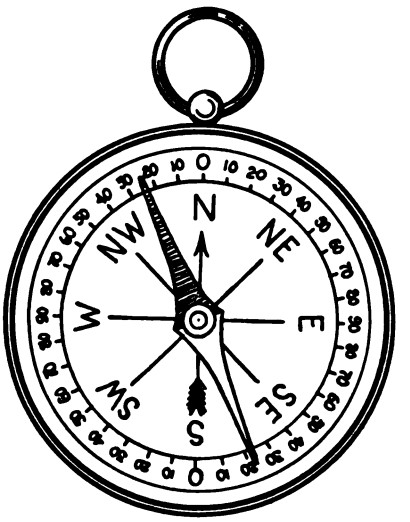


FIGURE 84. A compass showing the direction taken by the magnetic needle in the eastern part of the United States. The needle does not point to the true north, but to the North Magnetic Pole, and the sailor steering by the compass, must allow for this variation.

he can tell very nearly how long it will take to plow them, and how much seed it will take to plant them.

The surveyor, who must measure distances accurately, uses a steel tape four rods long,

called a **chain.** Eighty chains, or 320 rods, make a mile, and ten *square* chains, or 160 *square* rods, make one **acre.** In measuring distances at sea, the sailor uses a measure called a **knot,** which is about one and one-seventh common miles. The knot is also called a *geographical,* or *nautical,* mile.

Pictures, Plans, and Maps. In our study of geography we shall often find it

FIGURE 85. Picture of a schoolroom.

convenient to represent countries, cities, people, and other objects, by means of pictures, plans, or maps. We can visit the hills, valleys, streams, cities, and other places and objects which are near our homes, but most of us may never be able to visit distant countries; and we must therefore learn about them by means of maps, pictures, and descriptions of them written by travelers who have visited them.

A picture shows things as they appear to the eye. Distant objects appear smaller than those that are near at hand. If you look at any of the pictures in this book you will notice that the objects in the *foreground* appear much larger than those in the *background.* This is because when the photograph was taken, they were nearer the camera, which is really a kind of eye.

A plan is unlike a picture because it shows the size of objects without regard to their distance from us. In a plan, we represent objects as they appear to us when we look down upon them from above.

Plan of Desk and Book. On this page you will find the plan of a school desk with a book lying upon it. Let us make a plan of our own desk similar to this one. Place a book upon the desk and then stand up and look down upon it. Draw on a sheet of paper the outline of the desk and also the outline of the book. Each will be represented by an oblong, or rectangle, like the plan on this page.

These rectangles will be much smaller than the real desk and the real book, and each one of us has made oblongs of different sizes, although our desks and books are all alike in size. We must now find a method of drawing them so that all our drawings will be of the same size. To do this, measure the length and breadth of the desk. We find that it is two feet long and one and one-half feet wide. Now draw, near the bottom of the paper, a line one inch long. Below this line write *one inch equals one foot.* This line is our **scale,** and it means that for each foot of length and breadth of the desk, we must draw a line one inch in length on our papers.

Since the desk is two feet long and one and one-half feet wide, we must draw our rectangle two inches long and one and one-half inches

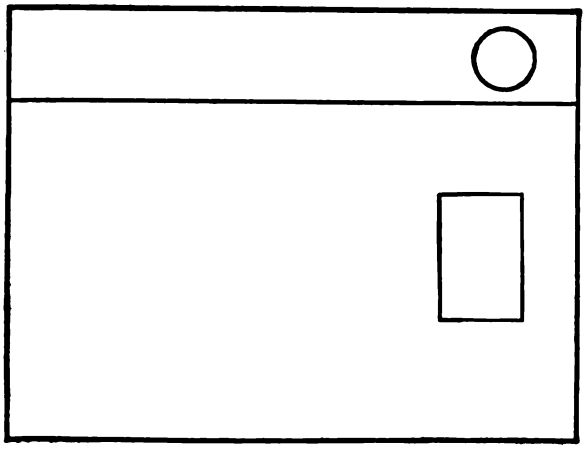


FIGURE 86. Plan of desk and book.

wide. Now measure the length and breadth of the book. Suppose it is nine inches long, and six inches wide. Then we shall have a

rectangle three-fourths of an inch long and one-half an inch wide to represent the book. If the book is six inches from the edge of the desk, the rectangle will be one-half an inch from the edge of the drawing.

Plan of the Schoolroom. With a tape-measure or a yard-stick, measure the length and breadth of the room. Let us suppose that it is twenty-four feet long and twenty

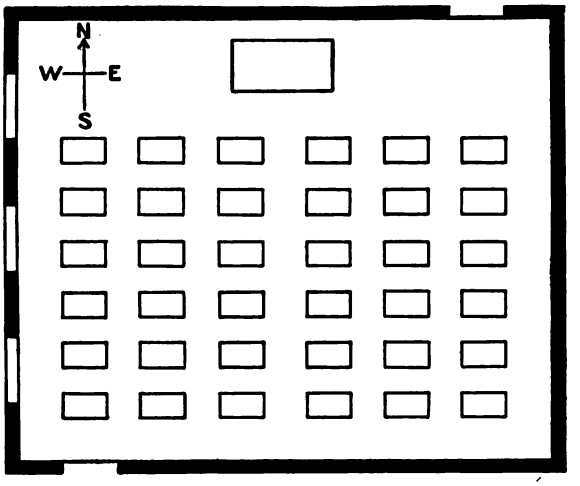


FIGURE 87. Plan of a schoolroom.

feet wide. If we use the same scale that we used in the plan of the desk, our paper would have to be twenty-four inches long and twenty inches wide. As our paper is not large enough for this scale, we shall use the scale — one-fourth inch equals one foot. Then an oblong representing the room will be six inches long and five inches wide.

We may now place in our plan the oblongs representing the teacher's desk, the piano, the pupils' desks, and whatever other objects the room contains.

Plan of a School Yard. Figure 88 gives the plan of a school yard. The plan shows the position of the schoolhouse, the walks leading up to it, the entrance to the yard, and the roads or streets on each side. Let us now make a similar plan of our school yard. We may measure it by "pacing it off," or by means of a tape-measure. Find out the width of the walks and the length and breadth of the building. Notice the shadows at twelve o'clock to find out the north direction; then you can tell in which

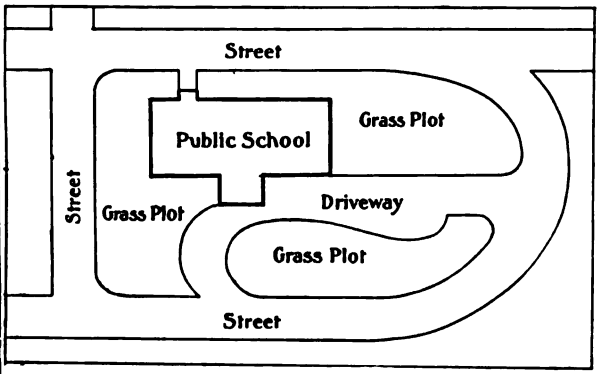


FIGURE 88. Plan of schoolhouse and grounds.

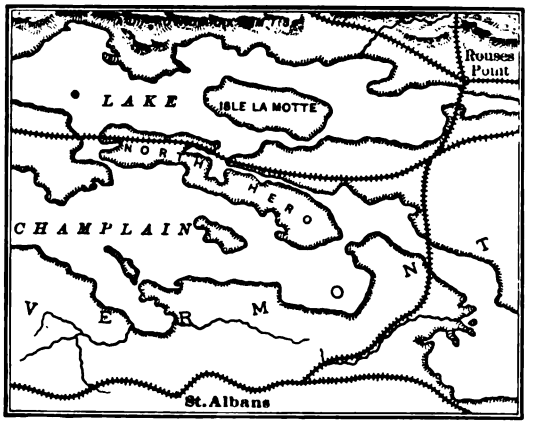
direction the schoolhouse faces; or you may find this by using a compass. When you have found out these particulars you are ready to make the plan.

Direction. Another thing usually shown on plans and maps is direction. On which side of your schoolroom does the sun rise? This, as we have learned, is east. Draw a line upon your paper pointing in this direction, and mark the end of it "E." The opposite end will be west and should be marked "W." Place the paper before you so that the east is on your right hand, and draw a line at right angles to the first line and crossing it at the center as you see in the drawing in your book. The line will point north and south. Mark the end which is farther from you, "N," and the end nearer to you "S." Your plan now tells you which part of the room is toward the east and also the direction of the other parts of the room.

The usual method of marking directions on a map is to draw an arrow pointing north. The position of this arrow may be found by means of a compass.

FIGURE 89. A Photograph.

FIGURE 90. A Relief Map.



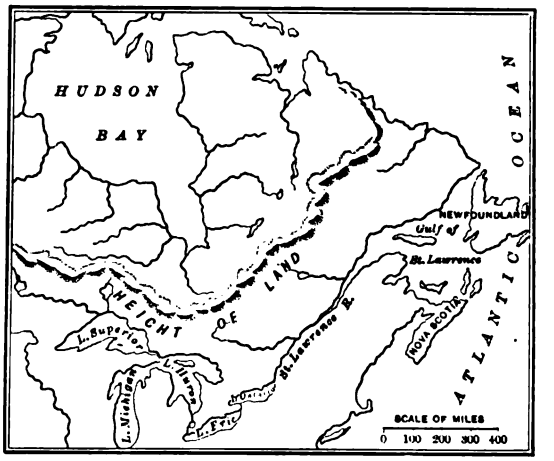


FIGURE 91. Maps of Figures 89, 90.

Maps. A map shows a part of the earth's surface as it appears when one is looking down upon it. In this way, it is like a plan. The difference between a map and a picture may be seen on this page. The pictures show mountains, valleys, cities, lakes, rivers, and bays, as they appear to the eye. The corresponding maps on the right of the pictures, show the method of representing the different objects in the pictures.

You will notice that the coast line and the streams are represented by black lines. A very wide river is shown by two black lines. The mountains are represented by fine lines drawn close together and the cities, by fine lines crossing each other forming squares and rectangles. The railroads are shown by a line crossed by finer lines which look like teeth. On each colored map in this book you will find a key, or explanations which tell how certain things are represented.

Different Kinds of Maps. On page 306, is a colored map of North America. This map shows coast lines, mountains, rivers, lakes, and boundaries, in the manner we have described. The method of representing cities is explained in the key.

On page 308 there is a relief map of the same continent. This map shows the height of the land by means of tints. The highest mountains are nearly black, the lower ranges are lighter in shade, and the plains still lighter. The rivers, lakes, and other

bodies of water are nearly white. Such a relief, or *raised* map, teaches us many things that we cannot learn from a flat map.

Colored flat maps are sometimes called political maps because they show such divisions as countries, states, and cities, which have been made by men. A relief map may be called a physical map, because it shows the physical, or natural parts of the earth.

Direction on Maps. In making a map it is customary to place the drawing so that north will be directly in front of us at the top of the map or page. East will then be on the right hand, and west on the left. When such a map is hung upon the wall, the top of the map is toward the north, the bottom toward the south, the right hand toward the east, and the left hand toward the west.

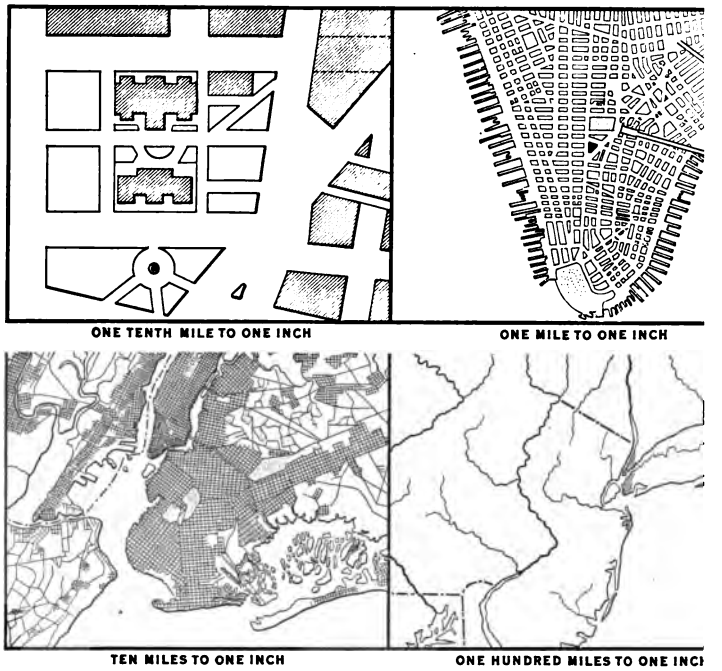


FIGURE 92. A part of New York City shown on four different sc

The Making and Reading of Maps. Nothing is more useful in helping us to understand geography than making maps and knowing how to read them. We sometimes make relief maps out of sand, shaping the sand so that it will represent hills, valleys, and plains. We may also make relief maps of clay or p Sometimes we represent elevations on a by tinting it with different colors. We for example, color the lowlands green high plains yellow, and the mountain re pink or brown. By *reading* maps, is m the ability to understand the meaning different lines and colors, so that we picture to ourselves the places shown

REVIEW. (1) Why is it useful for the sailor, the traveler, and the hunter to know how to tell direction? (2) How may one tell the east, west, north, and south directions? (3) Explain how a compass is made. (4) How is it used to find directions? (5) What measures are used for short distances? (6) What measure is used by the surveyor? (7) What is a nautical mile? (8) What is the difference between a picture and a plan? (9) Why do objects in the foreground of a picture appear larger than those in the background? (10) Why are maps and pictures useful in the study of geography? (11) What is a relief map? A political map? (12) How do we mark direction on maps? (13) For what are colors used on maps?

OBSERVATION WORK. (1) Find out the points of the compass at your home. (2) Why is the north side of the house cooler than the south side? (3) Find the North Star in the manner described in this lesson. (4) Magnetize a needle and make a compass for y (5) What persons have you observed who make the different units of measure, as the inch, foo mile, and chain? What use does each make of i How far is it from your house to the school? I you know? (7) How are distances estimated city? (8) Draw a plan of one of the rooms in you using a scale. (9) Find out how to tell direct looking at the sun. (10) Notice the difference b the vegetation on the north side of buildings, ston fences, and large trees, and that on the south sid observing carefully, you will be able to tell direc this way.

SUPPLEMENTARY READING. *Long:* Geography, pp. 21–29, 71, 72. *Baker:* Realist mentary Geography, Book I, pp. 25–40. *Blackie* Century Geography Readers, First Book, pp. Longmans' Pictorial Geographical Reader, Book I

PART II. THE EARTH

XVII. THE HEAVENLY BODIES

Stars and Planets. If we look up from any part of the earth on a clear night, we see the sky studded with stars. Some shine with a steady light, while others flash and twinkle.

If you watch the sky carefully for a few nights, you will see that the stars which shine with a steady light change their positions. They move across the sky in much the same manner as the moon. These stars are called **planets,** a word meaning wanderers. Those, however, which flash and twinkle, are always seen in the same place and are called **fixed stars.** They now occupy, apparently, the same positions that they occupied thousands of years ago.

The Constellations. Many years ago, astronomers divided the fixed stars into groups called constellations. Many myths and stories are associated with these star groups, and many of them are named from the gods and heroes of the ancient Greeks. We have learned that the fixed star **Polaris,** or the North Star, marks the north direction, and that two of the seven stars which form the outlines of the Great Bear, or the **Dipper,** guide us in finding the position of the North Star.

Among the stars which we should observe and read about, are the **Pleiades,** or the **Seven Sisters,** the hunter **Orion** with the three stars marking his belt, the **Twins,**

HOW TO STUDY. In all the directions for study so far given, you have been asked to *look down* at the earth; but in this lesson and the next, you must LOOK UP! Try to imagine that you are standing on the great ball of land and water which we call THE EARTH, and that it is bowling along in its journey around the sun, at the enormous rate of *18 miles a second* — swifter than the swiftest ball ever fired from a rifle or a cannon! The other planets are also racing with us about the sun — some faster and some slower — like a lot of runners on a circular race-course. Mercury, the swiftest planet, has the "inside track," being nearest the sun, and makes the journey in 88 days; but Neptune, far away on the outer edge of the great course, requires 165 years. The moon is the earth's "attendant" and travels with it around the sun; but thirteen times each year, or once in 28 days, it makes a journey of its own about the earth. The sun and the stars are so far away from us that we cannot see that they have any motion at all; but they are doubtless moving, for *motion* is the great law of the universe.

In studying the heavenly bodies, it is easiest to begin with the moon. If you watch it for several nights in succession you cannot fail to notice that it is traveling toward the east around the earth, although it *appears* to move toward the west. Next, watch for the appearance of Venus as evening star. It is the brightest of the planets, and shines with a clear and steady light. Jupiter and Mars also are easy to find. With a good field glass or a small telescope, you can see some of the *moons* of Jupiter. The fixed stars are easiest to study, as you merely have to become acquainted with them. They are always in the same positions. Learn first to pick out the Dipper and the North Star. You can easily find Orion, Sirius, and the Hyades. After you have become acquainted with a few of the more conspicuous constellations, you will quickly learn to distinguish others. In observing the sun and the stars, you must remember that their motion is only *apparent.* They appear to move from east to west because the earth on which you stand is rotating from west to east.

Auriga, Boötes, Pegasus, and the Dog Star, **Sirius,** the brightest fixed star in the sky.

With the eye alone we can see only a few thousand stars, but by the aid of a telescope, millions of others are brought into view. The planets are continually passing along

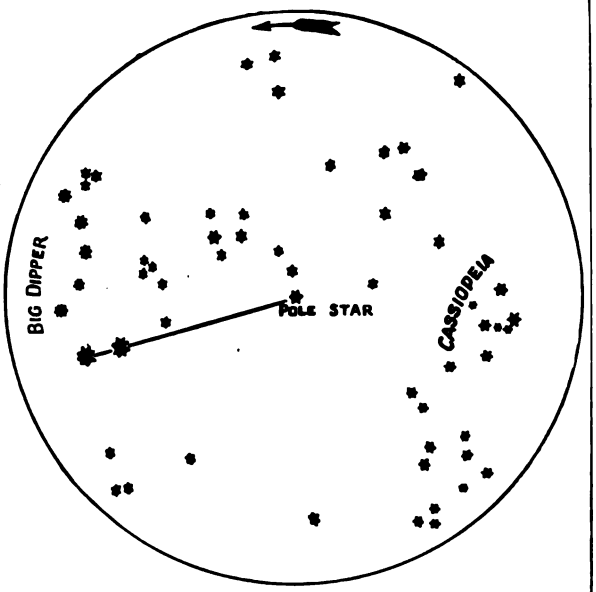


FIGURE 93. Some of the constellations near the North Star.

certain paths and returning again to the place where they were first observed. The earth is one of the eight planets, and if we should observe it from a great distance as we see the other planets, it would appear to us like one of them.

Names of the Planets. The planets are called by the names of the Roman gods. Nearest the sun is **Mercury,** named for the messenger of the gods, because of its swift motion. Next is **Venus,** the brightest of the planets. Next to Venus is our **earth,** after which comes **Mars,** named for the war god on account of his red color. Beyond Mars is **Jupiter,** the largest of the planets and named after the king of the gods. Beyond Jupiter are **Saturn, Uranus,** and **Neptune.** The last two are visible only through a telescope.

Moons. All the planets except Mercury and Venus have bodies revolving around them called moons. We shall soon read about our own moon and the changes in its appearance as it travels around the earth.

The Solar System. The sun, together with the planets and their moons, is called the Solar System. The sun is at the center of this system, and the planets revolve about the sun at different distances from it. The distance of the earth from the sun is about ninety-three million miles. It makes a complete journey around the sun in three hundred and sixty-five and one-fourth days; Mercury makes the journey in eighty-eight days, and Neptune requires one hundred and sixty-five *years* as long as ours to make one complete journey. The time required for any planet to make a journey around the sun is called its **year.**

Comets and Meteors. Comets and meteors are strange fiery bodies that occasionally appear in the heavens and pass quickly out of sight. Meteors, sometimes called "shooting stars," flash suddenly through the sky and sometimes fall to the earth's surface. Comets may usually be

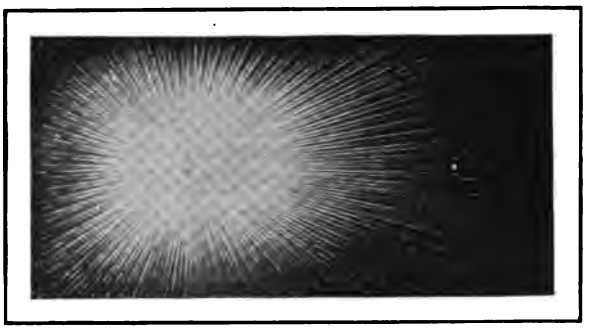


FIGURE 94. "Giant Sun" and one of his family. The small bright spot on the right represents the earth.

known by a fan-shaped light, called a tail, extending out in front of them. They circle about the sun at an enormous rate of speed and then dart away on some unknown path into distant parts of the universe, sometimes to reappear after many years.

REVIEW. (1) How can we tell the difference be-een a fixed star and a planet? (2) What is a constella-n? (3) Name some of the constellations. (4) How the planets named? (5) Beginning with the one irest the sun name the planets in order. (6) What is noon? (7) What is a meteor? (8) What is a comet l how may it be known? (9) What is the Solar stem?

OBSERVATION WORK. (1) From the almanac, l the name of the evening star. Look for this star ir the western horizon just after sunset. For a number evenings in succession observe the evening star just we shall observe the moon, to find out in which way it pears to be traveling. Compare its motion each night h that of a constellation or a fixed star. The morning l evening stars are planets. They rise and set like the sun, and travel across the sky from west to east in the same manner as the moon. (2) By means of the pointers locate the North Star. (3) Observe the position of the Big Dipper for several hours in succession and notice that it seems to revolve in a circle about the North Star. It completes the revolution in twenty-four hours. (4) Near the North Star find Cassiopeia, which has an outline suggesting a chair. On a map of the stars look up the position of Orion, the Pleiades, the Twins, and the Dog Star, Sirius, and then try to recognize them in the heavens. The three stars forming the belt of Orion point almost exactly toward Sirius. From the star map, you find out similar ways of locating other stars and constellations.

SUPPLEMENTARY READING. *Proctor:* Stories of Starland, Giant Sun and His Family. *Holden:* The Earth and Sky. *Porter:* The Stars in Song and Legend.

XVIII. THE MOON AND ITS CHANGES

The Moon Reflects the Sunlight. The n and the stars are great, round fiery dies, and send out their own light in the me way as a lamp; but the moon shines cause it reflects light from the sun.

If you hold a mirror so that a lamp shines on it, you can turn the mirror so that it

URE 95. This picture shows how the moon reflects light to the earth at night.

ll make a bright spot on the wall. We y the mirror reflects, or *turns back*, the ht of the lamp, but it does not shine of elf. In the same way the sun shines on the moon and the moon reflects the ht to the earth.

The Moon is Round Like the Earth. metimes during the day, when the sun is hind the clouds, we can see the round moon. It gives only a faint light because the sun is so much larger and brighter. If you should put a lighted candle in the same room with a large electric lamp, you could scarcely see the light of the candle; but if you turn out the electric light the candle will seem quite bright. So it is with the moon. At night when the sun is absent, it seems very bright. Although we cannot see the sun at night, it is still shining on the moon, and the moon reflects the light to us.

The Moon Travels Around the Earth. In the evening when there is a lighted lamp on the table or above it, ask someone to hold a small mirror before the lamp and walk slowly around it, keeping the mirror always turned toward the light. When the mirror is on the side of the lamp opposite to you all of the glass will be lighted up; but as it is carried around toward you, you will see less and less of the glass, and when it comes between you and the light, it will not send you any light at all.

The moon travels around the earth just as the mirror is carried around the lamp. When it comes between us and the sun, we cannot see it; but as it travels on, we see more and more until it reaches the side of the earth opposite the sun; there the whole face of it is lighted up.

The New Moon. Once each month, just after sunset you may see in the west a slender crescent of light opening toward the east. This is the **new moon,** and the tips of the crescent are called its **horns** (*Figure 96*).

We may understand how the crescent of light is formed if we allow a bright light to fall upon a globe having a polished surface. If the globe is between us and the light, it appears dark; but if we walk around it towards the light we first see a small part of the lighted side as a slender crescent like the new moon. As we walk farther toward the light, we see more and more of the surface of the globe lighted up. Finally, when we are on the same side of the globe as the light, we see the whole side of the globe lighted up in the form of a circle. We should have seen the same results if instead of our walking around the globe, it had been carried around us.

The Moon's Changes. Let us observe the moon at the same hour for several nights in succession. Each evening it is a little higher in the sky, and the crescent grows wider and wider. At the end of a week the moon will be half-way across the sky, and half of the side turned toward us will be lighted up. In this form it is called the **first quarter,** or half-moon. At the end of two weeks the moon has passed all the way across the sky and thereafter rises in the east just as the sun sets in the west, so that we are *between* the moon and the sun. We now see it with all its face lighted up and we call it the **full moon.**

The Moon's Journey Lasts a M
The moon makes a journey around the
from west to east in about twenty-eight
this period we sometimes call a *lunar* m
The time from new moon to full mo
about half of this time. After the mo

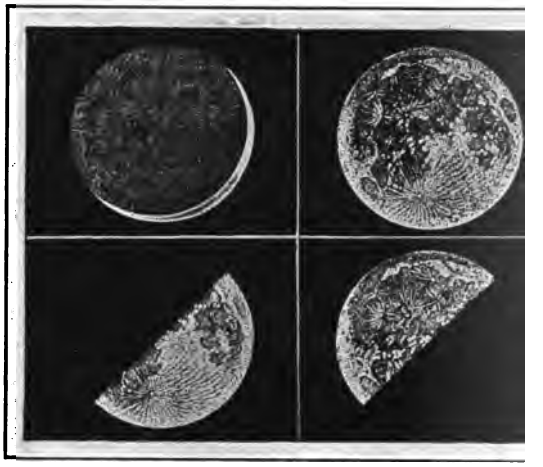


FIGURE 96. Changes, or *phases,* of the moon. Poi
the new moon, first quarter, full moon, and last q
Notice that the quarters face in opposite directic

full, it continues to rise later and l
When it rises at midnight, it has rea
its third quarter and we see half the
which is turned toward us, or a *quart*
the entire surface, lighted up. The l
are now turned toward the west, anc
moon is "waning," or growing sm
From new moon to full moon the mo
"waxing," or growing larger. At the
of a month the moon has passed ent
around the earth and again appears i
west after sunset as new moon.

REVIEW. (1) What is meant by new moon? First quarter? Full moon? Last quarter? (2) At what time of the day or night may each of these forms be seen? (3) What is a lunar month?

OBSERVATION WORK. (1) Find from the almanac the date of the new moon and watch for its earliest appearance. Notice the time when it is first seen. Watch it for several nights in succession and note its increased size and the direction of the horns. (2) Between new moon and full moon, look for the moon during the day. If the sun is dim, you may be able to see it. Why can you not see it if the sun is bright? (3) Find from the almanac the time of the full moon. Observe that it is seen in the east just as the sun is setting. Notic the moon rises about fifty minutes later each e (4) Try the experiment of carrying the mirror arou lamp. Place a rounded silver dish or cup near th and look at it from different positions; what d observe about the light that it reflects? (5) C wooden ball with tin foil and make it very smoot carrying this around the lamp you will see that it light in the same way as the moon.

SUPPLEMENTARY READING. *Niver:* P Geography, Chapter VI. *Proctor:* Stories of St Giant Sun and His Family. *Holden:* The Earth ar

XIX. FORM AND SIZE OF THE EARTH

The Earth Appears to be Flat. The earth so large and we are so small that we can e only a small part of it at one view. 'e may compare ourselves to tiny insects awling over a large globe. Even if we ould climb to the top of a mountain, we

FIGURE 97. A ship coming into port.

uld not see farther away than forty or ty miles unless the air were remarkably ear. From such a height, the earth would pear to us as a flat circle like a plate, with lleys and hills scattered here and there.

As the earth *appears* to be flat, most ople for many hundreds of years believed at it really was so. As they had learned traveling that the land is bounded by eans, they came to believe that the earth nsisted of a circular tract of land surunded by a broad stream of salt water.

How the Earth was Proved to be ound. About four hundred years ago a w men, who had made a careful study geography, began to think that the earth ight be round like a ball. Christopher olumbus was one of these men. He iled from Palos, a port in Spain, in search the land known as the Indies. Now, the dies were far to the east of Spain; but olumbus thought that they were *so far* st that he could easily reach them by sailing around the earth in the opposite direction. After a voyage of several weeks toward the west, he reached a new world, to which the name of America was afterwards given; but believing that he had arrived at the Indies, he called the natives of the New World, Indians, and they are still known by this name.

A few years after the voyage of Columbus, another sailor, by the name of Ferdinand **Magellan,** sailed westward all the way around the earth, and one of his ships returned to Spain whence it had started. This voyage proved that the earth is a huge ball, or **sphere.** Many sailors have voyaged around the earth since Magellan's time, and it is now a common thing for tourists to make such a journey. Although Magellan's voyage took two years or more, the journey around the earth has recently been made in less than forty days.

Other Proofs that the Earth is Round. When one travels far upon the earth's surface in any direction, new objects keep coming into sight before him, and objects behind disappear. Sometimes the top-mast of a ship is seen far off on the ocean. As the ship approaches land, the mast seems to rise higher and higher until the whole ship comes into view.

If two persons walk toward each other from opposite sides of a hill, they first see each other's heads; but as they approach

FIGURE 98. Views of a ship sailing away from the land. What does this picture prove about the shape of the earth?

each other, their full forms come into view. In the same way, the rounded surface of the ocean keeps the hull of the ship out of sight long after the tips of the masts may be seen. If the surface of the ocean were flat, the hull of a ship would be seen first, because it is the largest part of the ship.

A shadow tells us something about the shape of the object that makes it. If you hold your hand in front of a light, the shadow has the same shape as your hand. The shape of the shadow, however, changes with the *position* of the object. If a plate is held edgewise to a light, the shadow is an oblong, but if the flat side is toward the light, the shadow is round.

A Ball Always Casts a Round Shadow. If a ball is held in front of a light, its shadow will be round, in whatever position it is held. A round object like a ball, is the only object that *always* makes a round shadow. Now, when the earth comes between the sun and the moon, its shadow is often seen on the moon, and it is always round. Not only is the earth like a ball, but the sun, moon, and stars also have this form.

Size of the Earth. We may get some idea of the great size of the earth by considering the length of time it takes to travel around it. If a steamship should sail at the rate of twenty-five miles an hour, it would require six weeks to complete a voyage around the earth. A sailing vessel would require several months. The distance around the earth is called its **circumfer** and is nearly 25,000 miles. The ea axis, or **diameter,** is about 8,000 miles long (*page 301*).

FIGURE 99. The shad the ball is shown appears when lc down upon it.

Representation of the Earth's Surface. Since the earth is too big for us to travel all over it, we need some means of presenting its appearance to the eye. Accordingly, we make **globes** on which we show the different divisions of land and water by means of colors. When we wish to show a small portion of the surface of the earth, we make **maps** such as have been described in another chapter. These maps show the elevations and depressions of the land, the bodies of and water, and the countries and c They have a scale by means of whic may measure the distance from one to another.

REVIEW. (1) How was the earth first proved to be a sphere? (2) On the school globe trace a water route from east to west around the world. Notice how much the Panama Canal shortens this route. (3) Give other proofs that the earth is a sphere. (4) What is the circumference of the earth? (5) What is the diameter? (6) What use do we make of globes and maps?

OBSERVATION WORK. (1) The horizon is the line where the sky and earth appear to come together. What have you noticed about the shape of the horizon as it appears to you from the top of a hill, or when you are far out on the water? (2) Notice that from such places you can see about the same distance in every direction, and that the horizon is shaped like a circle. (3) Why do people sometimes climb to the tops of trees, or go up on the roofs of houses to see distant objects? (4) Hold different objects before a light and notice the of their shadows. (5) Roll a piece of paper into a cy about two inches long, and glue it upright on a ball the school globe. As the globe, or the ball, is rc which part of the paper cylinder first comes into Which part is last seen? Would this be true if the were fastened to a flat surface? Try this experim gluing the paper cylinder to the top of a table, or tc object on the table; go to the farthest part of the and walk toward it. How much of the paper can yc

SUPPLEMENTARY READING. *Jackson:* tronomical Geography, pp. 1–16. *Andrews:* Seven Sisters, pp. 1–5. *D'Anvers:* Science Ladders, V *Gee:* Short Studies in Nature Knowledge. *Montg* Beginner's American History, pp. 1–20. *Slocum:* S Alone Around the World. *Holden:* The Earth anc

XX. THE ROTATION OF THE EARTH

Real Motion and Apparent Motion. If we look out of the window when riding on a fast-moving train, the trees, fences, lights, and other objects seem to fly past us in the opposite direction. If the track is smooth so that we are not jolted about too much, we can easily imagine that our train is not moving at all.

The earth, like the train, is moving all the time, but with such smoothness and steadiness that we do not notice the motion. The sun and the other heavenly bodies seem

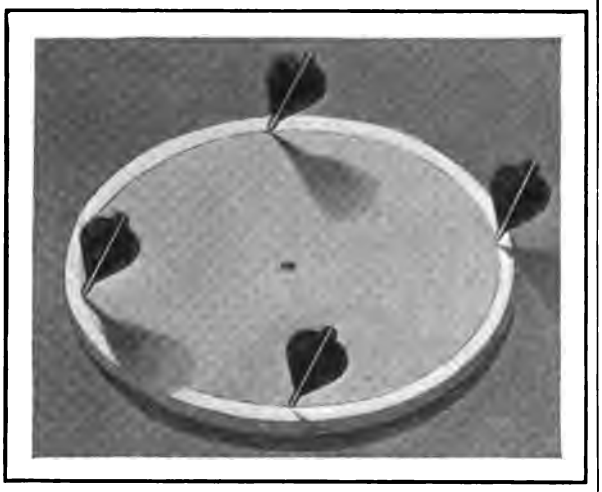


FIGURE 100. A top spinning and moving about in a circle.

to rise in the east, to move across the sky, and to disappear in the west. They are really at rest, or nearly so, while the earth is turning rapidly about.

This daily motion of the earth we call **rotation.** It resembles the motion of a top or a wheel; or, if we can imagine a ball or a balloon floating in the air and whirling rapidly at the same time, we can get a correct idea of the earth and its motion.

East is the Direction of the Earth's Motion. The earth is always rotating in the same direction. This direction we call east. It is for this reason that the sun and the other heavenly bodies *appear* to move in the opposite direction. They are seen first in the east and move toward the west. We say, "they *rise* in the east and *set* in the west."

The Axis of the Earth. Thrust a hatpin through the center of an orange, and make the orange whirl about the pin. The line about which any object turns is called its **axis,** and hence we call the hatpin the axis of the orange.

The hatpin is a *real* axis; but when a ball whirls about in the air, it rotates on an *imaginary* axis. There is no real axis, like the hatpin, running through it, but it turns about in the same manner. The earth also rotates on an imaginary axis.

Poles are Places on a Sphere that Have no Motion of Rotation. Let us now study the school globe, which is made to represent the earth. It is mounted on two pivots so that it rotates. The axis is an imaginary line running through the globe from one pivot to the other.

Make a mark with a crayon on the globe half-way between the pivots. As the globe is rotated the mark moves rapidly. If it is made near one of the pivots it moves more slowly, and if it is made at the very end of the pivot it does not move at all.

The points on a rotating body which do not have any motion are called the **poles.** As there is such a point at each end of the axis, every rotating body has two poles. Look at the spinning top in the picture. Can you tell where the poles of the top are located?

How to Tell Direction. It happens that one end of the earth's axis points almost exactly to the North Star, and for this reason it is called the **North Pole.** The opposite end of the axis is called the **South Pole.**

We are now able to understand exactly

the meaning of north and south on the earth. The north direction is always toward the North Pole, and the south direction is toward the South Pole. It is for this reason that it is not quite correct to say that north is "toward the top of the map" and that south is "toward the bottom of the map." In another lesson we shall learn also why it is not quite correct to say, "East is toward the right hand and west is toward the left hand"; or "East is toward the sunrise and west is toward the sunset."

Daylight and Darkness. Place the school globe near a lighted lamp or candle, or directly in front of the window. Notice that the part of it that is turned toward the lamp is lighted up, while the part turned away from the lamp is dark. Perhaps you can see that the very *darkest* part is farthest from the lamp, and that the part receiving most light is nearest the lamp.

Now, if the lamp were the sun, and the globe were the real earth, we should say that the part turned farthest away from the sun is having **midnight,** and that the part turned nearest to the sun is having **midday,** or noon. The parts half-way between the midday and midnight points are having sunrise or sunset, and, therefore, it is twilight there; that is, "between light and dark."

A Day is the Time of a Complete Rotation of the Earth. Rotate the globe so that the mark which you made half-way between the poles is in the twilight on your right hand. It is now sunrise, or rather *lamp-rise,* at that point. Keep rotating the globe till the mark comes opposite the lamp. It is then noon where the mark is; and when it has passed into the twilight on the left hand it is having sunset. The mark then passes on into the darkness through the midnight point, and back to sunrise again. You have now rotated the globe completely around.

Every place on the earth is all the time turning similarly, in relation to the sun; and when the earth has turned completely around on its axis, that place has had sunrise, noon, sunset, and midnight. The time that the earth takes to make one complete rotation is called a **day.** This day is twenty-four hours long, and includes a period of light and a period of darkness, which we call **day** and **night.**

FIGURE 101. The axis and poles of the earth.

As the earth rotates toward the east, the sun is first seen in that direction; then it seems to move across the sky and disappear in the west. The sun does not *rise* or *set* at all. It is like the lamp in front of the globe. Its apparent motion is due entirely to the rotation of the earth.

The expressions "sunrise" and "sunset" have been used ever since the time when men believed that the sun really traveled through the sky every day and at night was carried back to the east to begin a new journey the next morning.

As the earth rotates, all objects on its surface such as houses, animals, and men, as well as the atmosphere, or air, which surrounds the earth, rotate with it. Because everything on the earth is traveling in the same direction, we do not notice the motion at all until we look up at the heavenly bodies and observe that they appear to move across the sky in the opposite direction.

Gravitation. When a muddy wagon wheel or a wet grindstone is turned rapidly, the mud and water are thrown into the air. The earth is turning faster than any wheel that you ever saw, since a point on its surface, midway between the poles, is moving

t the rate of a thousand miles an hour. Ve may wonder, then, why loose objects ke stones, buildings, and animals are not hrown off into the air just as the water is hrown from the grindstone.

The earth has a power of attraction which ı like the attractive power of a magnet for piece of steel; this attraction is called gravitation, and it holds all objects firmly to the earth's surface.

When any object is dropped, it falls to the earth because the earth attracts it. Gravitation was first studied and explained by an English philosopher, named Sir Isaac Newton. It is said that he was first led to study the attraction of the earth by seeing an apple fall from a tree.

REVIEW. (1) How do the sun and the other eavenly bodies appear to move? (2) Why do they ap- ear to move from east to west? (3) Name some objects ıat rotate. (4) What is meant by an axis? What is ıe axis of the earth? (5) What is meant by the poles?) In which direction does the earth's axis point? (7) 'hat star is nearly over the North Pole? (8) What is eant by a day? (9) Why does the sun appear to rise the east and set in the west? (10) Why are objects ot thrown off the earth's surface by rotation?

OBSERVATION WORK. (1) When riding on a oat or train, observe the apparent motion of the objects hich you pass. (2) Notice the moon when clouds are rifting in front of it. It is easy to imagine that the moon self is moving. (3) Watch the sun just as it is rising. ix your attention upon the horizon and you may see ıat the horizon is slowly sinking, and that the sun is at st. So also, at sunset, you can easily imagine that the orizon is rising up to meet the sun. (4) Observe an oject that rotates on an axis and note that the axis itself oes not move. (5) Toss a ball into the air, making it hirl at the same time. Where is the axis in this case? (6) Fasten a string to a ball and twist the string, causing the ball to rotate. Mark the points that do not change their position. What is the line connecting them called? (7) Hold objects in your hand and let them fall to the ground. What causes them to fall? (8) Suppose you were on the opposite side of the earth; in which direction would objects fall there? (9) Imagine yourself also at the north pole or at the south pole; in which direction would objects fall at these points? Note the fact that objects always fall toward the center of the earth. (10) Fasten a weight to the end of a thread, and hold it suspended in the air. In which direction does the thread point? Draw the weight to one side and let it vibrate back and forth like the pendulum of a clock. Note that when it comes to rest it points straight toward the center of the earth. Such an arrangement, called a **plumb line,** is used by builders to decide when posts, the walls of houses, etc., are exactly perpendicular. A **perpendicular** line is one that points directly toward the center of the earth.

SUPPLEMENTARY READING. *Jackson:* Astronomical Geography, Chapter VII. *Redway:* Manual of Geography, Chapter VI.

XXI. LATITUDE AND LONGITUDE

How Places are Located. If you were sked to tell where a certain building is ɔcated, you would say that it is on such a ɔad or street; and you might also fix its ɔcation by saying that it is near some ther object, such as a river, lake, or moun- ain.

In the city where there are many build- ıgs, each one receives a number. But uppose we wish to give the location of the ity itself, or the location of an island far ut in the ocean, where there is no other oint from which to reckon. Let us see ow this can be done.

The Equator, Parallels, and Meridians. 'laces on the earth are located by means of ircles called parallels and meridians drawn upon its surface. Fasten a crayon to the end of a string, and holding the string at the point on the school globe marked "North Pole," draw a circle around the globe half-way between the poles. This circle is called the Equator because it divides the surface of the globe into two equal parts, or **hemispheres.** With a shorter string draw other circles upon the globe having the same direction as the Equator. These circles are called parallels.

Now draw upon the globe a line connecting the North Pole and the South Pole. This line is a semicircle and is called a meridian. If you continue this meridian all the way around the globe, the circle formed is called a **meridian circle.** Notice that a

meridian circle, like the Equator, divides the surface of the globe into two hemispheres.

Make a cross anywhere on the school globe, and draw a meridian passing through it. With a string and a crayon draw also the parallel passing through it. Notice now that the cross is located where the parallel and meridian intersect, and we may give its location just as we may give the location of a house standing at the corner of a street. Every place on the earth's surface has a meridian and a parallel passing through it, and each parallel and each meridian has a number.

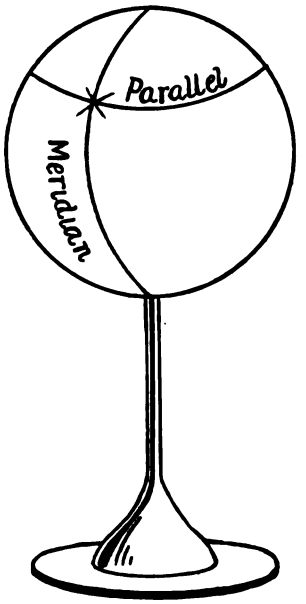


FIGURE 102. Showing how places on a globe are located.

How Circles are Divided. Every circle, no matter what size it may be, is divided into 360 equal parts called *degrees*. Each degree is divided into 60 equal parts called *minutes*, and each minute into 60 equal parts called *seconds*. The Equator and the meridian circles are called **great circles,** because they divide the earth into hemispheres. The parallels are called **small circles,** because they are smaller than great circles. They divide the surface of the globe into unequal parts.

The length of a degree measured on the Equator or on a meridian circle is about 69½ miles. It varies a little, however, in different parts of the earth. The length of a degree of longitude measured on any parallel varies according to the distance of the parallel from the Equator. It measures less and less as we approach the poles. (See *page 301.*)

Latitude. Distance measured in degrees, minutes, and seconds north or south of the equator is called latitude. If measured

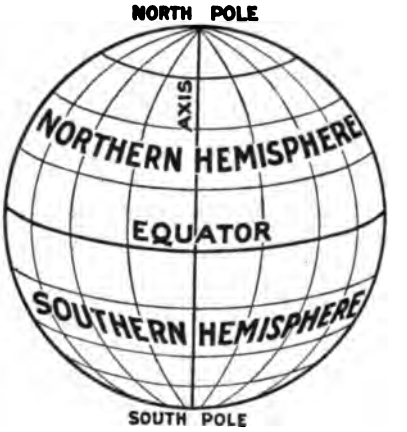


FIGURE 102a.

north of the Equator it is called *north* latitude, and if measured south of the Equator it is called *south* latitude. In traveling north or south from the Equator to either pole, one would pass through ninety degrees of latitude or one-fourth of a circle.

Longitude. In measuring distance east or west on the earth's surface we begin at a selected meridian called the **Prime Meridian.** The Prime Meridian generally used is the meridian passing through Greenwich, a place near London. The Prime Meridian is marked 0, meaning no degrees. We may begin at any point on the Prime Meridian and measure either east or west, following the Equator or one of the parallels. Distance east of the Prime Meridian is called *east* longitude, and distance west of it is called *west* longitude. As longitude is reckoned half-way around the earth

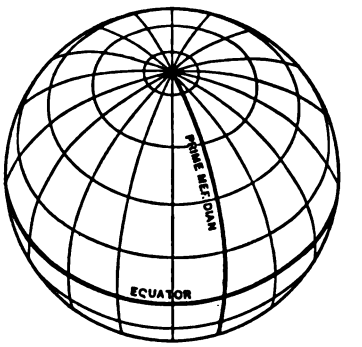


FIGURE 103. The Equator and the Prime Meridian.

in each direction, no place can have more than 180° longitude, east or west.

How Latitude and Longitude are Used. In giving the location of places on the earth, we state the number of the meridian and of the parallel passing through that place. The meridian and parallel of any place are easily found by a surveyor or a navigator by means of certain instruments. A simple way of finding one's latitude is to take the elevation of the North Star; by elevation we mean its height, or distance above the horizon.

FIGURE 104. Taking an observation of a star or of the sun to find the latitude of a ship.

If you were at the Equator the North Star would appear to be on the horizon. But for every degree you travel north, the star appears to rise one degree. If you should travel all the way to the North Pole, the star would be directly overhead; that is, it would be 90° above the horizon.

So it happens that the elevation of the North Star at any place north of the Equator, is the latitude of that place. As the North Star is not *exactly* over the North Pole, this method would not be quite accurate.

The sailor makes use of latitude and longitude in finding the location of places when at sea. He is provided with charts of every part of the earth, showing the location of all important places, the depth of the water, and the location of the lighthouses and other signals. By first finding the latitude and longitude of his vessel, he can tell by looking at his charts in which direction to sail to reach any given point.

REVIEW. (1) How do we describe the location of places in the country? In the city? (2) How are places located on the earth's surface? (3) Describe the method of drawing parallels and meridians on a globe. (4) What is meant by the Equator? By a meridian? By a parallel? (5) What is a meridian circle? (6) Why may we have any number of parallels and meridians on the earth? (7) What is meant by a great circle? A small circle? (8) What is a degree? A minute? A second? (9) Define latitude, longitude, north latitude, south latitude, east longitude, and west longitude. (10) What is meant by a prime meridian? (11) Which meridian is generally used as the Prime Meridian? (12) Describe a method of finding the latitude of a place. (13) How many degrees of latitude or of longitude can any place have?

OBSERVATION WORK. (1) Think of some place you have visited and try to describe its location. Give the location of your home; of your school; in what direction is one from the other? (2) What use is made of fences in the country? (3) Have you ever seen any boundary marks between farms, towns, counties, or states? (4) How can you describe the location of the sun or of a star? (Remember that the horizon is the line where the sky and the earth seem to meet, and further, that the point in the sky directly over your head is called the zenith. You already know the name of the different directions.) (5) Suppose you should bury something in the ground and wished to mark the place so that no one but yourself could find it. How could you make use of a compass in doing this? (6) Notice some object such as a boat, a rock, or an island out in a lake; how can you describe its location?

SUPPLEMENTARY READING. *Jackson:* Astronomical Geography, Chapter III. *Niver:* Physical Geography, Chapter IV.

XXII. THE ZONES AND THEIR BOUNDARIES

The Tropic of Capricorn. Place a lighted candle on a large table so that the flame is about as high as the center of the school globe. Move the globe to the north side of the candle and turn it so that the axis points away from the candle and toward the North Star. This is the position that the earth has on December 21, at the beginning of winter. The candle represents the sun (*Figure 110*).

Tie a string around the candle just below the flame and fasten a crayon at the other end of the string. Now, stretch the string

FIGURE 105. This photograph tells us how the sun shines upon the earth, when the Northern Hemisphere has winter, and the Southern Hemisphere, summer. The right-hand side of Figure 106 shows how far north the rays of the sun reach at this time, and where they are vertical.

out horizontally so that the end of the crayon touches the globe. The string will now be perpendicular to the globe. Rotate the globe and let the crayon trace a circle upon it. The circle thus traced by the vertical rays of the sun on December 21, is called the Tropic of Capricorn. The string represents the rays of the sun, which are perpendicular to the surface of the earth at the Tropic of Capricorn on December 21.

As we have learned that the earth receives the greatest amount of heat when the rays of the sun shine perpendicularly, what season do you think December brings to the people who live near the Tropic of Capricorn?

The Arctic Circle. As the sun is vertical at the Tropic of Capricorn on December 21, it must shine in a slanting direction everywhere north and south of it. By looking at the globe, you will see that the North Pole is turned away from the candle. The rays of the candle cannot reach it, and it does not receive any light at all. It is the same way with the North Pole of the real earth. The rays of the sun do not reach it on December 21, and it is having midnight.

But how far north of the Tropic of Capricorn do the rays reach? You will find on the globe a line marked "Arctic Circle." This circle is 23½ degrees from the North Pole, and it marks all the places on the earth that are having sunset on the twenty-first of December. Everywhere north of this circle it is night.

Make the string a little longer, so that the crayon will just reach the Arctic Circle; if, now, you rotate the globe, the crayon will trace this circle all the way around it. Instead of being perpendicular to the globe, the string

FIGURE 106. The globe on the right shows the position of the earth December 21; at this time the rays of the sun are vertical at the Tropic of Capricorn and horizontal at the Arctic Circle. The globe on the left shows the position of the earth June 21. How do the rays of the sun strike at this time?

s now horizontal, or *tangent*, to it. The line raced by the horizontal rays of the sun on December 21, is called the Arctic Circle.

IGURE 107. This photograph shows how the sun shines upon the earth when the Northern Hemisphere has summer and the Southern Hemisphere has winter. The left-hand side of Figure 106 shows how far north and south the rays of the sun reach at this time and where they are vertical.

The Tropic of Cancer. Now let us move the globe around to the south side f the candle, so that the North Pole is turned toward the light and the South Pole turned away from it. Stretch out the string so that it is perpendicular to the surface of the globe, and the crayon will trace a circle around it when it is rotated. This circle is called the Tropic of Cancer. Since the rays of the sun are perpendicular to this circle, the season there must be summer; and since this circle is north of the equator where we live, it is *our* summer. What month of the year do you think it is? What season do you think the people at the Tropic of Capricorn are having?

IGURE 108. A globe divided into Northern and Southern Hemispheres.

FIGURE 109. This view of a globe shows how the sunlight strikes the earth at the beginning of spring and autumn. Notice that the light reaches both poles and that the sun will be vertical at the Equator.

The Antarctic Circle. If, now, you move the crayon toward the South Pole so that it is horizontal, or *tangent*, to the surface of the globe, it will trace the Antarctic Circle, just as before it traced the Arctic Circle. It is now sunset at all places along the Antarctic Circle, and between this circle and the South Pole, the people are having a long night. The Antarctic Circle is $23\frac{1}{2}$ degrees from the South Pole, just as the Arctic Circle is $23\frac{1}{2}$ degrees from the North Pole.

The Equator. Let us now move the globe so that it is half-way between the north and south sides of the candle. See that the axis still points in the same direction, for

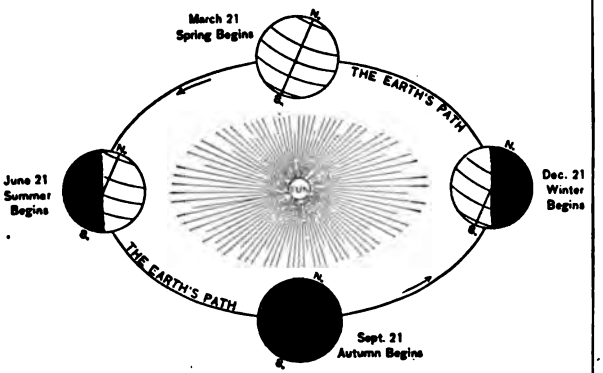


FIGURE 110. The position of the earth at the beginning of each season.

the direction of the axis is always the same. See also that it is neither turned *away* from the candle nor *toward* it. Stretch out the string again so that it is perpendicular to the surface of the globe and trace another circle around it. This circle is the Equator. It is half-way between the poles and half-way between the two Tropics. It divides the earth into the two hemispheres which we have called the Northern and the Southern.

The Frigid Zones. The region around the North Pole, enclosed by the Arctic Circle, is called the **North Frigid Zone**; and the region around the South Pole, bounded by the Antarctic Circle, is called the **South Frigid Zone.** Sometimes these zones are called the *Polar* Zones.

Both frigid zones have two seasons, which we call summer and winter. The summers last only about two months, and the weather is never warmer than it is during our spring. The sun rises only a short distance above the horizon, and its rays always fall in a very slanting direction. During the winter there is little sunlight and the weather is very cold. At the poles themselves the sun remains above the horizon for six months and for six months it is not seen at all. Thus the poles have six months of day and six months of night. At other places in the frigid zones, the days and nights vary in length from a few minutes to several months.

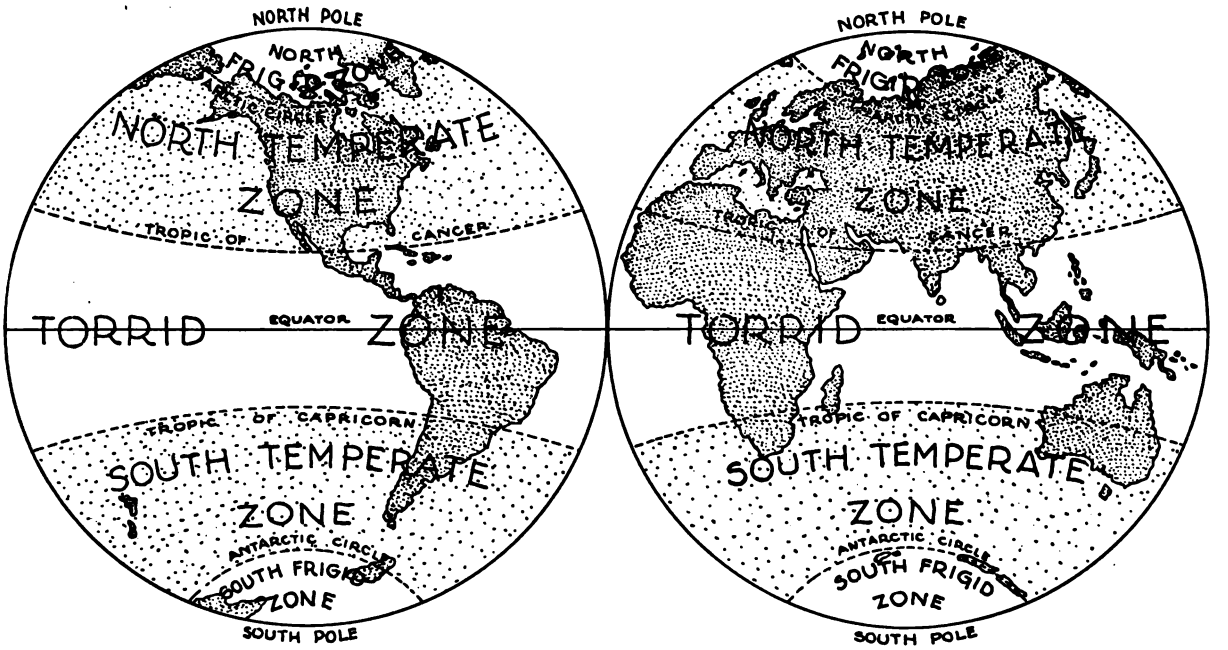


FIGURE 111. The zones and the circles which mark their boundaries.

The Torrid Zone. That part of the earth's surface which is between the Tropic of Cancer and the Tropic of Capricorn is called the **Torrid**, or Hot Zone. We sometimes call it also the "Tropical Belt," or simply the "Tropics," because it is bounded by the two Tropic Circles.

Since the sun is always nearly vertical in the Torrid Zone, the weather there is so warm that plants grow all the year round. This zone also has two seasons called the **wet** and the **dry seasons.** North of the Equator the wet season lasts from April to October, and the dry season from October to April. South of the Equator the wet season lasts from October to April, and the dry season from April to October.

You will notice that the seasons come at opposite times north and south of the equator. We may call the wet season winter, and the dry season summer; although it is so warm in the Torrid Zone that we may say it has summer all the year round. During the wet season there is a great abundance of rain, and during the dry season there is also a considerable amount, but much less than during the wet season.

The Temperate Zones. The belt of the earth's surface north of the Torrid Zone, between the Tropic of Cancer and the Arctic Circle, is called the North Temperate Zone, and the belt south of the Torrid Zone, between the Tropic of Capricorn and the Antarctic Circle, is called the South Temperate Zone. The temperate zones have four seasons, as we have already learned, and they also come at opposite periods in each zone; thus, when we have summer, the people of the South Temperate Zone have winter, and when they have summer, we have our winter. The same is true about spring and autumn.

Since the weather in the temperate zones is never extremely hot or extremely cold they have received the name *temperate.* The sun's rays always fall in a slanting direction, but in the North Temperate Zone the shadows at noon fall toward the north, and in the South Temperate Zone they fall toward the south.

Life in the Different Zones. What have you learned about life in the cold regions? About life in the hot regions? What kind of people did we find in each of these regions? The people of the temperate zones, are, as a rule, more highly civilized than those of the hot or cold zones.

Three Zones of Plant Life. As the growth of plants is favored by heat and moisture, we find the most luxuriant plant life in the tropical regions. In the temperate regions, plants are less numerous, and many of them die during the winter. In the frigid zones, there are few trees, and these are mainly **evergreens.** Grasses and a few flowering plants are also found there. Some of the plants have bright-colored blossoms, and some bear fruits belonging to the berry family.

In the temperate zone both evergreen and deciduous (page 92) trees are found. Among the evergreens are the pine, spruce, fir, cedar, and hemlock. The pines are of several varieties and grow over a wide extent of territory. In the colder regions, the soft white and red pines are found. Further south, is found the hard pine, which is known as pitch pine, or long-leafed pine. Its wood is very hard and lasts a long time. The spruce grows best in the colder parts of the temperate zone where the winters are long and the summers short. The most useful variety of cedar is the red cedar, or redwood, which is found throughout the United States and especially on the Pacific Coast north of San Francisco, where the trees attain an enormous size. Hemlock, or fir, is found in many parts of the world. Its bark is useful for tanning leather and its wood is used for building purposes.

Among the hardwood trees of the temperate zone, are the maple, ash, hickory, birch, and elm. The wood of all these trees is useful for making furniture and for all purposes where

durability is required. The linden or bass wood, and the black ash, split into fibers, are used for making baskets and mats. The

FIGURE 112. A hard-pine forest.

cottonwood and the catalpa are found in the central part of the United States, and the chestnut, horse-chestnut, poplar, willow, and tulip trees are found in many sections. In the southern parts of the temperate zone, we find the magnolia, palmetto, laurel, and live oak.

Among the smaller forms of vegetation peculiar to the temperate zone, are the **grasses.** In many parts of the world where there is too little rainfall for the growth of forests, hardy grasses which can endure a dry climate, are found in abundance. Such regions are known as *savannas*, *prairies*, *steppes*, and *pampas*.

In the tropical plant zone, are found many evergreens having broad leaves, among which are the palms and palmettos. There are perhaps a thousand or more varieties of the palm tree. These trees have tall trunks with leaves growing at the summit, but they have no branches. Among the more useful varieties, are the cocoanut and date palms, the sago palm, and the wax palm. The tropical zone produces also mahogany, rosewood, ebony, boxwood, and cypress, all of which are useful for cabinet work.

Effect of Elevation. In ascending a mountain in the Tropical Regions, from the base to its summit, one may see the same succession of plant zones as between the Equator and the poles. The lowlands at base of a mountain in South America or Mexico, produce palms and other plants requiring much heat and moisture. At the height of several thousand feet, the hardwood forests and plants of the temperate zone are found. Still higher, we pass a belt of evergreen trees, and finally we reach an elevation where trees cease to grow, and only plants resembling those of the Arctic regions are found. Above 10,000 feet elevation, neither plants nor animals are found, and the mountain tops are covered with perpetual snow.

Zones of Animal Life. As most animals live upon plants, we find that very many noted for size and strength live in the Tropical Regions, where vegetation is most

FIGURE 113. A growth of young red cedars on the Pacific Coast of North America.

abundant. As a rule, animals grow less in number, size, and fierceness as we go from the Equator to the poles. Nevertheless,

FIGURE 114. Deciduous trees.

the Polar Zone furnishes the polar bear and the Alaska bear, while the grizzly bear and the puma live in the North Temperate Zone. All these animals are noted for size and fierceness.

Most animals of the cold zone have thick fur to protect them from the severe weather. The water animals are more numerous than those of the land, because the water is warmer and affords a better supply of food. There are many birds in the cold zone, most of which have white plumage; they obtain their food from the water.

The animals of the temperate zones are chiefly "grass eaters." The herds of antelope and buffalo that once roamed over the western part of the United States, have disappeared, and the horse, cow, sheep, and other domestic animals have taken their places. It is true in the other continents also that the domestic animals take the place of wild animals as fast as the land becomes settled.

The tropical regions support many brilliantly colored birds, but they are not famous for their song, as are the birds of the temperate regions. Reptiles and insects are especially abundant in warm countries. Each continent has its own peculiar group of animals, for the reason that oceans and wide straits prevent them from passing from one continent to another.

REVIEW. (1) What is the Tropic of Capricorn? (2) Find, on the school globe, how far this circle is from the Equator. (3) Where is the Arctic Circle? (4) How far is it from the North Pole? (5) Where is the Antarctic Circle? (6) How far is it from the South Pole? (7) What is the Tropic of Cancer? (8) How far is it from the Equator? (9) What zone lies between the two tropics? (10) What circles bound the North Temperate Zone? (11) The South Temperate Zone? (12) When is the sun vertical at the Tropic of Cancer? (13) Where are its rays horizontal at that time? (14) When is the sun vertical at the Tropic of Capricorn? (15) Where are its rays horizontal at that time? (16) Can you tell when the sun is perpendicular at the Equator? (17) What seasons begin at that time? (18) When does our summer begin? Our winter? (19) Tell something about the plants of each zone. (20) Tell something about the animals of each zone. (21) What kind of plants would you expect to find in climbing a high mountain? Near the Equator?

OBSERVATION WORK. (1) Notice the height of the sun in the sky during the spring and summer. Notice its height during the autumn and winter. (2) When is the sun highest in the sky? When is it lowest? (3) Two boys, one of whom lived in the North Temperate Zone and the other in the South Temperate Zone, wrote letters to each other on the twenty-first of June. What do you think each one said about the weather? What do you think they would say if they wrote on the twenty-first of December? (4) Find out from the calendar the length of the longest day where you live; find also the length of the shortest day. (5) On which of these days is the sun highest in the sky?

SUPPLEMENTARY READING. *Jackson:* Astronomical Geography, Chapter IV. *Andrews:* Seven Little Sisters, pages 1–19. *Schwatka:* The Children of the Cold. *Ballou:* Footprints of Travel, Chapters IV, V, XXVI, XXIX, XXX. *King:* The Picturesque Geographical Readers, First Book, pp. 186–226. *King:* Elementary Geography, pp. 60–74. *Horton:* The Frozen North. *Stickney:* Earth and Sky, Books I, II.

XXIII. PLANTS AND ANIMALS

Where Plants are Found. Everywhere on the earth, where there is soil, and enough heat and moisture, we find plants of some sort. They grow at the bottoms of ponds and lakes, and in the sea. Some fasten themselves to rocks, stones, or to the trunks of trees and grow without being rooted in the ground at all.

Land plants grow best where there is plenty of rich, loose soil, and an abundance of heat and moisture. The hot, moist regions of the earth are noted for their dense forests and for a great variety of plant life. In very cold countries there are no trees and only a few plants of any kind. Plants which have no roots, such as mosses and lichens, are common in cold regions. Lowlands, being warmer than mountains, have the more abundant plant life. On very high mountains the plant life resembles that of the regions near the poles. (See *page 89.*)

Plant Families. Plants that resemble each other in the appearance of their different parts, or in their manner of growth, are said to belong to the same family. Thus,

FIGURE 115. Branch of a pine tree showing the cones which bear the seeds, or *spores*.

in our forests, we find the pine, hemlock, spruce, and cedar, bearing a cone-shaped fruit. We call such trees **conifers,** or cone-bearing trees. These trees, as well as others which keep their leaves all the year round, belong to the **evergreen** family; while the trees which shed their leaves in autumn are called **deciduous** trees (*Figure 114*).

Another large family of plants is known as the **grass** family. Most members of this family grow up each year from the seed, and die when the cold weather comes. Wheat, barley, oats, rye, rice, corn, the sugar-cane, and the bamboo belong to the grass family. The grain plants are often called **cereals** (*Figure 117*).

Berries form another plant family. They have a pulpy flesh with seeds imbedded in it. To this family belong grapes, tomatoes, gooseberries, blueberries, the banana, lemon, and orange.

The **stone fruits** form a family which includes the peach, plum, prune, apricot, and cherry. Pears and quinces belong to the **apple** family. Melons, cucumbers, squashes, pumpkins, and citrons belong to the **gourd** family.

Fiber plants, such as cotton, flax, and hemp, furnish material for making cloth. Fiber is also obtained from many kinds of grasses, from certain palm trees, and from the husk of the cocoanut.

Wild and Cultivated Plants. All plants at one time grew wild — without being cultivated by man; but man, by cultivation, has improved those plants that are useful for food, clothing, medicines, or for other purposes.

Every plant needs a particular kind of soil and climate that it may thrive best. Sugar-cane and rice grow in warm, wet lands near the seacoast, and on the flood plains of rivers. Prairie lands, which have deep, black soil, are best adapted to corn, wheat, oats, and other grains. Peaches, berries, and melons like a warm climate and a soil made of sand and loam. Evergreen trees will grow far up on the sides of mountains,

FIGURE 116. The raffia palm, a native of Madagascar; the leaves furnish a strong fiber used for making mats, baskets, and other articles.

while the oak, the elm, the hickory, and other deciduous trees, grow better in the deeper soil of the lowlands.

Some plants require more moisture or more cultivation than others. The farmer and the fruit grower can greatly improve

FIGURE 117. Grain plants: 1. corn; 2. wheat; 3. rye; 4. barley; 5. oats; 6. rice; 7. sugar-cane. Forage plants: 8. timothy; 9. red-top; 10. vernal; 11. alfalfa; 12. clover; 13. prickly pear cactus. Spices: 14. pepper; 15. cloves; 16. allspice; 17. nutmeg. Fiber plants: 18. sisal hemp; 19. cotton; 20. flax.

their crops by choosing for each the soil and location best adapted to it.

Usefulness of Plants. Some plants are useful for their seeds, some for their fruits, and some for their stalks, leaves, or blossoms. Some plants, like the potato, have **tubers,** or thick fleshy knobs, growing on their roots, which serve for food.

In the case of other plants, the part of the stalk that grows underground becomes thick, and is useful for food. Among these are the beet, turnip, carrot, parsnip, and radish. Among the plants whose leaves are used, are the tobacco, the tea plant, and many vegetables.

The stalks and leaves of the grass plants supply food for animals. Sugar is made from the juices of the beet and the sugar-cane. Hops and cloves are dried blossoms of plants, while hundreds of extracts, or **perfumes,** are made from the blossoms of the rose, lily, violet, and other flowers.

Many useful drugs and medicines are made from the roots, leaves, bark, or other parts of plants. Opium is thickened juice from the seed pod of the poppy plant. Quinine is made from the bark of the cinchona tree, and cocaine from the leaves of the coca plant.

Coffee, nutmegs, and cacao, or cocoa, are the seeds of plants. Cinnamon is the inner bark of the cinnamon tree; red pepper is the ground-up pod of a plant; allspice is an unripe berry; ginger is the ground root, and mustard, the ground seed of a plant.

The Cereals are cultivated for their seeds. They are the most useful of all plants, because they furnish the chief food of mankind. Next in importance are the fiber plants, which furnish material for clothing. Plants which supply fruits, beverages, and nuts, are also of great value because in many countries they grow without cultivation and supply the chief articles of food.

The forests of the world furnish lumber and timber for our furniture and houses, and wood pulp for making paper.

Other useful articles obtained from the forests, are turpentine, tar, rosin, india-rubber, gutta-percha, camphor, and gum arabic; madder, indigo, brazil-wood, logwood, and other plants are used in making dyes. Valuable oils are derived from different plants, such as linseed, cottonseed, and palm oils, and the oils of lemon, orange, peppermint, wintergreen, lavender, and cloves.

Where Animals are Found. Animals are found in all parts of the world where they can find food that is suitable for them. They are largest and most numerous in the warm regions of the earth, and are less in number and variety in the colder regions. This is not, however, so nearly true of animals as it is of plants.

Classes of Animals. Animals that feed upon other animals belong to the **carnivorous,** or flesh-eating, class. To this class belong the lion, tiger, leopard, polar bear, fox, dog, and cat. Sea animals such as the walrus, the seal, the whale, and all kinds of fish, are flesh-eating animals. In cold regions where plants are almost entirely lacking, we find large carnivorous animals.

The second division of the animal kingdom is the **herbivorous,** or grass-eating, class. This is the class most useful to man, as it includes all the domestic animals, such as the horse, ox, camel, goat, sheep, and hog; to it belong the elephant, the hippopotamus, the rhinoceros, the buffalo, and the giraffe. Animals of this class are the largest and most numerous where plant life is most abundant.

Some animals of the herbivorous class, as well as many birds, are migratory; that is, they change their homes when the seasons change. They go to the south with the coming of winter, and to the north with the coming of summer. The reindeer and the musk ox, which inhabit the cold regions near the

Arctic Ocean, travel many miles when winter comes, to find more abundant food. Deer, antelope, the elk, and other grass-eating animals travel from place to place to find grass on which they feed.

Wild Animals. Among the fur-bearing animals hunted for their skins, are the seal, fox, wolf, bear, otter, beaver, mink, marten, and ermine. Game animals such as deer, antelope, and wild hog, the goat, and many species of birds are hunted for their flesh. The fiercest and most dangerous wild animals are found in the hot regions of the earth, and belong to the flesh-eating class. As a rule the animals of the herbivorous class are not dangerous to man.

Domestic Animals. Animals kept by man around his home are called domestic animals, and are raised in all parts of the world for supplying food and clothing, and for performing labor. The donkey and the llama are sure-footed, and are used for carrying merchandise in rough countries, where there are no good roads.

The camel and the dromedary are the burden bearers of the desert. The horse, ox, camel, and water buffalo, are useful to the farmer for drawing the plow, and for hauling the produce of the farm. Cattle, sheep, and hogs furnish meat for food. Various other useful products are made from their hides, hair, wool, and horns.

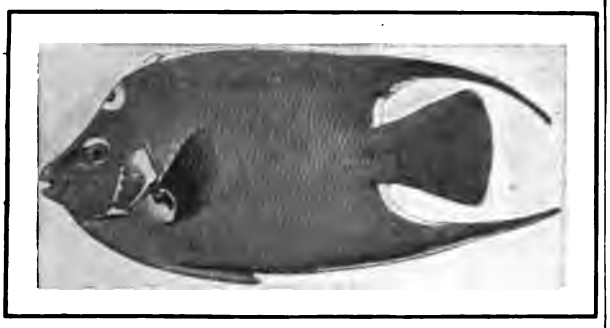


FIGURE 118. The yellow angel fish, found among the Bermuda Islands.

The most useful members of the bird family are chickens, ducks, geese, and turkeys. Valuable feathers are furnished by the ostrich, the eider duck, and the rhea of South America. The bright plumage of many birds is used for ornament.

Water Animals. Most animals that we have named live on the land either the whole or part of the time. Other animals

FIGURE 118a. A herd of reindeer in a forest in the northern part of Asia.

spend all their time in the water. To this class belongs the whale, which is the largest animal in the world. It was formerly much sought after on account of its oil and the flexible "whalebone" found in its jaws.

The common varieties of sea fish, such as the cod, herring, and mackerel, are leading articles of food in every part of the world. Shellfish, such as oysters, clams, lobsters, and crabs, are found in shallow waters along the coasts of nearly every country. The waters of the land are the home of many kinds of fish which are caught for food.

Besides these useful varieties of animal life found in the waters, there is a multitude of other curious and interesting creatures. Sponges are the homes of minute animals, and are found attached to rocks in shallow seas. The coral takes limestone out of the water and builds it up in the form of a rock. Many fishes found in the warmer parts of the ocean are remarkable for their curious shapes and bright colors. In the deepest waters, fish are found with horny scales and without eyes.

REVIEW. (1) What is needed to make plants grow? (2) What is meant by plant families? Name some of them. (3) How are plants improved by cultivation? (4) What must the farmer do in order to secure the best crops? (5) Name some plants useful for their seeds. (6) What plants are cultivated for their fruits? (7) What plants are useful for their roots or stalks? (8) Name plants useful on account of their leaves; on account of their blossoms. (9) What plants are useful for oils or dyes? 10) Name two classes of animals. (11) Name five animals belonging to each class. (12) What animals live in the sea? (13) Name animals that live both on land and in water. (14) Name the chief domestic animals.

OBSERVATION WORK. (1) Notice the kinds of trees near your home. Study the leaves, the seeds, the bark, and the wood. What kind of blossom does each have? What uses are made of these trees? (2) Describe the making and cultivation of a garden. Name the different vegetables raised and tell which part of the vegetable is used for food. (3) Notice the wild plants growing by the roadside. Learn to recognize the aster, goldenrod, butter and eggs, bluet, violet, buttercup, dogwood, hepatica, and other common species. Notice the times of flowering and the kinds of seeds. (4) Notice the changes that take place in plants at the coming of winter. Which trees lose their leaves? Which plants die? What about their bulbs and roots? Examine the bud of a horse-chestnut tree and notice how it is prepared for growth in the next spring. (5) What animals are common about your home? Notice their appearance and mode of life. How do they spend the winter? How do they secure food? Observe the habits of fish, worms, ants and other insects. (6) What birds remain in your neighborhood throughout the year? What birds are migratory? How can you recognize the robin, bluebird, blackbird, humming bird, swallow, phoebe, oriole, and others. Notice their methods of nest building, their songs, calls, food, etc.

SUPPLEMENTARY READING. *Chamberlain:* How we are Clothed, pp. 129–156. *Kaleel:* When I was a Boy in Palestine, pp. 90–94. *Morris:* Home Life in all Lands, Book III, Book I, pp. 1–104. *Knight and Jenks:* Animals of the World. *Kelly:* Leaves from Nature's Story Book, Volumes II, III. *Murché:* Science Readers, Books III, IV, V, VI. *Niver:* Stories of Common Things. *D'Anvers:* Science Ladders, Vol. II.

XXIV. THE OCEAN

The Ocean is a Great Reservoir. A reservoir is a place where water is stored for use in our homes or for other purposes.

FIGURE 119. Breakers and surf along the seashore.

We may call the ocean a great reservoir for supplying the whole earth. It is kept full by the rivers of the earth, all of which flow into it, and yet so much water is carried away in the form of vapor, that the ocean never rises above its usual level.

The Ocean is a Path to Every Continent. The ocean occupies about three-fourths of the surface, or outside of the earth. As all the continents are surrounded by its waters, one may sail to any part of their shores except in the very cold regions, where the ocean is blocked with ice.

If you should take a steamer at Boston or New York and sail directly east, you would come, in four or five days, to the continent of Europe; if you should sail southeast from New York you would reach Africa, and if you should sail south, you would come to the continent of South America. From San Francisco, on the western coast of our country, you could go by steamship to the continents of Asia and Australia; but this journey would take twice as long as the voyage to Europe.

Divisions of the Oceans. Although the ocean is *one* great body of water, it is divided into four branches by the continents. (See *page 102.*) We are familiar with the names of these divisions. The largest is the Pacific Ocean. The second largest division is the Atlantic Ocean, and the third is the Indian Ocean. The Arctic Ocean surrounding the North Pole is the smallest.

The Level of the Ocean. We have learned in our lesson about lakes, that

there are some which have no outlets, because they never overflow. In this respect the ocean is like a great salt lake. The

FIGURE 120. Position of the Pacific Ocean on the globe.

water never rises or falls except as the result of waves and tides. This is what we mean when we say that the ocean level is always the same.

The water is taken out of the ocean by evaporation just as fast as it flows in from the rivers. The water of the ocean is salt for the same reason that some lakes are salt, and it must be growing more and more salty all the time because the rivers are continually carrying salt into it and none is ever taken out.

How Waves are Caused. Anyone who has visited a pond or lake knows what is meant by waves. Any disturbance at the surface of the water will cause them. Children often amuse themselves by throwing stones far out into a pond, and watching the waves roll toward the shore.

Usually, waves are caused by the wind blowing upon the water. You may even make little waves in a basin of water by blowing upon it or by striking against the side of the basin. Water is so easily moved that it is seldom entirely still.

Effects of Waves. At the seashore, one may always see waves rising and falling, rolling up the sandy beach as *surf*, or beating against the rocks. If the wind is strong the waves rise higher and break upon the shore with great force, often beating down wharves and piers, or destroying buildings that stand near the shore. The ceaseless beat of the waves against the shore grinds up rocks and pebbles into sand, and spreads it out in the form of flat **beaches.** These make delightful places for bathing and boating, and many curious things that have been brought in by the waves may be picked up along the beach.

Tide is the Regular Rising and Falling of the Water. If you have ever spent a day at the seashore you have noticed that at times the water rises higher and higher along the shore. Perhaps, if you sat on the sand you have been obliged to move up the beach several times in order to keep out of the reach of the tide. After several hours

FIGURE 121. Position of the Atlantic Ocean on the globe.

the water stops rising and begins to retreat down the beach. In a few hours, it stops, and then slowly rises again. This rising and falling of the ocean is called the tide. It rises for six hours and then falls for

six hours. When the tide is highest it is called **high tide,** and when it is lowest it is called **low tide.**

Pleasures at the Seashore. The seashore is a delightful place to live during the hot weather. The cool breezes which blow landward during the hot part of the day, attract thousands of people from the cities. There is a great deal of pleasure in watching the ocean with its ever changing surface, and in listening to the sound of the surf as it breaks upon the shore.

One may watch ships going out to sea or approaching the land, and a walk along a rocky

FIGURE 122. Showing the position of the Indian Ocean on the globe.

beach will teach us many things about the work of the ocean, and the plants and animals which live in it. The chief pleasures, however, are bathing, boating, and fishing. The best place for bathing is a broad, sandy beach, where the water gradually deepens and where there are breakers, or surf. Such beaches are found on nearly every coast. The shores of many lakes also afford fine places for bathing.

The Ocean Supplies Fish. While the water of the ocean is salt, it is not too salt for fish to live in, and many kinds of fish useful for food may be caught near the shores. Some are caught from the docks and piers; but to catch certain fish one must go quite a distance from the land. Fishermen often go far out to sea to catch mackerel in nets, and to angle for cod and halibut. Some of the varieties caught near the shore are bluefish, sea bass, and flounders. Clams and oysters are also found in abundance along the seacoast. Clams are dug out of the sand on the beaches, and oysters are taken from shallow waters by means of a rake or dredge (*Figure 168*).

Two Kinds of Coast Line. The place where the ocean and the land meet is called the coast line. In some places the coast line is straight, or **regular,** but in other places the water flows far up into the land, forming gulfs and bays. Along the eastern coast of our country are many islands, peninsulas, capes, and headlands. Some of these are high and rocky, rising steeply out of the water. There are also many inlets, or indentations, which are called seas, gulfs or bays, and the mouths of the rivers are wide and deep. Such a coast line is called **irregular.**

Many of the islands are close to the shore, and are separated from it by straits, channels, or sounds. The whole coast of New England is very irregular; farther south, the coast is flat and sandy, but still quite irregular. The harbors are not so good as those farther north, but there are many shallow places which are good feeding grounds for fish and oysters, and many swamps and lowlands where the seeds of the grasses attract wild ducks, geese, and other water fowl.

Harbors are Useful to Trade. The inlets along our coasts are useful as places where ships may anchor safely, and where they may come to the shore for loading and unloading goods. A good harbor is an excellent location for a city, and most of our large coast cities have good harbors. For handling goods along the waterfront, long

piers are built out from the shore, where ships may be safely fastened while they are receiving or discharging their cargoes or passengers.

Harbors are so important for coast cities, that sometimes where there is no good natural harbor, a portion of the water is enclosed by a strong wall of stone, which breaks the force of the waves, and hence is called a **breakwater.** Behind this breakwater, ships may anchor in safety. Many harbors are made shallow by sediment carried into them by the rivers, or by sand that is washed in from the ocean. All this material must be dredged out and carried away to sea. A dredge is fitted with a long shovel which is lowered to the bottom of the

FIGURE 123. A sandy beach on the New England coast.

harbor where it scrapes up the mud and lifts it out, depositing it on the deck of a boat. The work of keeping our rivers and harbors in good condition is done by the United States government, and many dredges and men are kept employed all the time.

Dangers along the Coast. Where the coast is rough and rocky, and where there are rocks or shallow places near the shore, there must be some means of warning ships of these dangers. If a ship should strike upon a rock, or upon a bed of sand, it might be wrecked; and if it should chance to be sailing along a dangerous coast during a fog, it might run ashore and be broken to pieces. For this reason great lamps are placed in tall structures called **light-houses** which are built along the coast to warn sailors of rocks and other dangers. Ove

FIGURE 124. Breakwater at Panama.

hidden rocks and shoals, floating signal with bells, called **bell-buoys,** are placed t serve as a warning to ships.

Pilots are Sometimes Needed. It ofte happens that a harbor must be entered b following a certain path called the **channe** Where this is the case, lights are arrange to guide ships into the channel, and signal are placed along the channel so that it ma be safely followed. In all our importan coast cities there are men called **pilots,** wh

FIGURE 125. Light-house and life-saving station on rocky coast.

make it their business to become familiar with the channels and to guide ships safely into the harbor. Every incoming vessel takes a pilot on board and intrusts the ship to his care.

Life-Saving Service. Although every care is taken to prevent the loss of ships and sailors, many vessels are wrecked along our coasts every year, on account of severe storms or accidents of some kind. Accordingly, the government has built life-saving stations in the more dangerous places and equipped each with life-boats, life lines, and a force of men.

Whenever a vessel is wrecked, the first object of the life-savers is to get the passengers safely ashore. If the sea is too rough to go out in the life-boats, they sometimes shoot a line from a cannon so that it falls over the wrecked vessel. Then a device called a breeches buoy is hauled out to the ship over the rope, and in this the passengers are brought to shore.

The Ocean is a Highway for Ships. The ocean forms a highway on which ships may sail to every part of the world. It is the most important means for carrying goods from one country to another. Thousands of people cross the ocean every year for pleasure, and the goods which are carried in ships every year are worth thousands of millions of dollars. We have learned that many of the things that we use for food, clothing, and shelter are brought over the ocean in ships, from distant countries.

In early times, only small sailing vessels were used upon the ocean, but now enormous steamships are built, which cost millions of dollars, and which can carry many thousands of tons of freight, besides several thousand persons as passengers or crew. One of the largest steamships recently built is nearly a thousand feet long and ninety feet high, having ten stories, or decks. It carries a crew of 800 sailors, 5,000 passengers and 50,000 tons of freight (*Figure 76*).

Such a large vessel moves steadily through the water and is not disturbed by winds, waves, or tide. It is propelled by means of huge engines, and makes a speed of from five to six hundred miles a day.

REVIEW. (1) Why may the ocean be called a reservoir? (2) In which direction would you sail in going from North America to Europe? What ocean would you cross? (3) In which direction would you sail to reach each of the other continents? What ocean or oceans would you cross in each case? (4) Name four of the oceans in order of size. (5) Why does the ocean always remain at the same level? (6) How is water taken out of the ocean? (7) Why is the ocean water salt? (8) What are waves? How are they caused? (9) What damage is sometimes done by waves? (10) What is meant by the tide? (11) What is the coast line? (12) Name the different forms of land found along the shore. (13) What forms of water are found only at the seacoast? (14) Where are fish and oysters found? (15) Where are water fowl found? (16) What are harbors and for what are they useful? (17) Why do people like to live at the seashore in summer? (18) In what places are light-houses built? (19) What are buoys? (20) How do sailors find the way into a harbor? (21) What are pilots? (22) Tell something about the life-saving service. (23) What is the difference between a sailing vessel and steamship? Which is the more useful, and why? (24) Name all the ways you can in which the ocean is useful to men.

OBSERVATION WORK. (1) Is there a reservoir in or near your home? If so, how is it kept filled with water? (2) If you have ever made a visit to the seashore or to a lake, tell what you noticed there. What did you observe about the motion of the water? (3) Watch a boat or vessel of any kind out upon the water when the wind is blowing. How does it appear to move? Does it rise and sink? If so, what is the cause? (4) If you have ever walked along the shore of any body of water, tell what you found there. (5) If you have ever noticed ships at the docks in the harbor, tell what kind of work was being done on or near them. (6) Name some things useful for food and clothing that the ocean helps bring to us.

SUPPLEMENTARY READING. *Ballou:* Foot-Prints of Travel, pp. 10–15, 44–56, 374–391. *Horton:* The Frozen North. *Kelly:* Leaves from Nature's Story Book, pp. 5–61. *Tarr:* Elementary Geology, p. 251. *Shaler:* Story of Our Continent, pp. 85–87, 150–152. *Fairbanks:* The Western United States, pp. 75–85.

XXV. THE DIVISIONS OF LAND AND WATER

The Continents. On pages 302 and 303 you will find a map of the earth's surface divided into Eastern and Western Hemispheres. The Eastern Hemisphere is sometimes called the Old World, and the Western Hemisphere, the New World. The map on this page shows the land masses and the oceans as they are actually situated on the earth.

About one-fourth the surface of the earth consists of land, while three-fourths of it is water. The land consists of six great masses called continents. Two of the continents project southward from the North Pole. The larger is called **Eurasia,** because it is made up of Europe and Asia. The smaller is **North America.** The continent of **Africa** is joined to Eurasia by the Isthmus of Suez. The continents of the Western Hemisphere are North America and **South America;** they are joined by the Isthmus of Panama. Southeast of Eurasia, is **Australia,** the fifth continent, while the newly discovered land surrounding the South Pole forms a sixth continent which has been named **Antarctica.** About this land little is yet known.

Other Land Forms. Land masses entirely surrounded by water are called **islands.** Nearly all the large islands are situated near the continents. On the shores of continents and islands are projecting masses of land nearly surrounded by water; they are called **peninsulas.** Smaller land masses which extend into the water are called **capes, headlands, points,** or **promontories.**

A narrow neck of land joining two larger land masses is called an **isthmus.** The two most important isthmuses in the world are those which have been pointed out as joining continents. The Isthmus of Suez has a canal across it wide and deep enough to allow the largest ships to pass from the Mediterranean Sea to the Red Sea and then into the Indian Ocean without sailing around Africa. The canal across the Isthmus of Panama, now completed, will save a long voyage around South America for ships passing between the Atlantic and Pacific Oceans.

The Oceans and Their Branches. The great body of water surrounding all the continents is divided into oceans. That

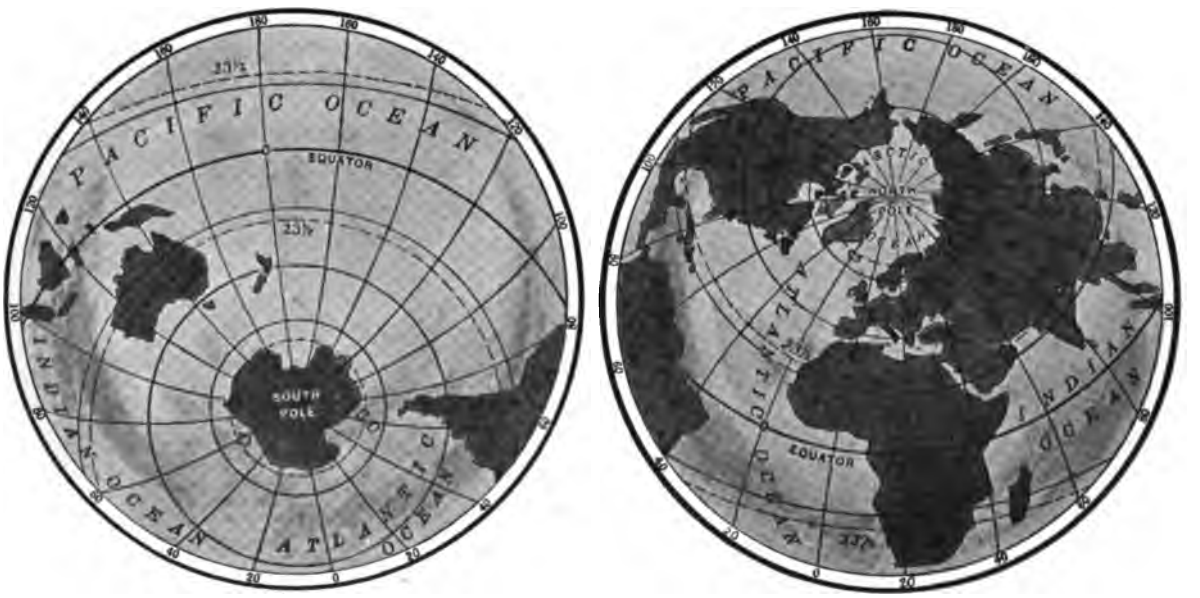


FIGURE 126. The continents and oceans as they are situated on the globe.

part of it lying between Europe, Africa, and the two Americas, is the **Atlantic Ocean.** The part between the Americas and Asia is the **Pacific Ocean.** South of Asia is the **Indian Ocean,** and the body of water surrounding the North Pole is called the **Arctic Ocean.**

It was formerly thought that the South Pole also was surrounded by a body of water. This body was called the **Antarctic Ocean;** but explorers who have recently visited this region tell us that it consists of a vast elevated mass of land. Hence there is, properly speaking, no Antarctic Ocean unless we give this name to the waters bordering the Antarctic Continent.

The arms of the ocean which project into the land are called **seas, gulfs,** and **bays.** A narrow passage of water connecting two larger bodies of water is called **a strait.** Wider passages of water are sometimes called **sounds** or **channels.** Inlets from the ocean which are protected from the winds, by the surrounding land, are called **harbors.**

Continental Islands. The islands which lie near the borders of the continents are called **continental** islands. They are usually separated from the continents by shallow straits, and the plants and animals which flourish on them, as well as their rocks and minerals, resemble those of the neighboring continents. For these and other reasons, it is supposed that the continental islands were once a part of the continents themselves, and that they were separated from them by a sinking of the land which allowed the ocean to flow in and cover the lowlands.

Islands of the Ocean. The islands found in the oceans, at a distance from the continents, are of two classes. The first class consists of islands which have been formed from matter thrown up from the bottom of the ocean by volcanoes. They are called **volcanic** islands.

The Hawaiian Islands belong to this class. The largest island of this group, Hawaii, contains two active volcanoes which are still building up the islands by occasional eruptions of lava.

The second class consists of coral islands, which have been built up in the shallow, warm waters along the coast, in the form of reefs, or in coral rings around sunken volcanic peaks. The coral *polyp*, or simply *coral*, as

FIGURE 127. The Western Hemisphere.

FIGURE 128. The Eastern Hemisphere.

it is called, is a minute animal that lives chiefly in warm ocean waters. It has the power of taking limestone from the sea water, and building it into various forms.

Some of the coral formations resemble rounded boulders, while others extend upward through the water in trunks and branches resembling trees. The coral is not built up all the way to the surface of the water, but its branches serve to hold the material floating upon the sea, such as plants, trees, and shell-fish, so that in time a coral island appears at the surface. After a longer time, palms and other forms of tropical plants spring up, and the island finally becomes suitable for the home of man.

DEFINITIONS

(1) **Continents** are the largest divisions of land.

(2) **Islands** are land masses entirely surrounded water.

(3) An **isthmus** is a narrow neck of land connect two larger masses of land.

(4) A **peninsula** is a mass of land nearly surroun by water.

(5) A **cape** or **headland** is a point of land project into the water.

(6) A **promontory** is a mountainous cape.

(7) **Oceans** are the largest divisions of the gr body of salt water surrounding the continents.

(8) A **sea, gulf,** or **bay** is a part of an ocean wh projects into the land.

(9) A **strait** is a narrow passage of water connect two larger bodies of water.

(10) **Channels** and **sounds** are wide straits.

REVIEW. (1) What is a hemisphere? (2) Of what does the surface of the earth consist? (3) Name the continents. (4) Which continents are connected by isthmuses? (5) Name the oceans. (6) Locate each ocean. (7) Name the three classes of islands. (8) How are volcanic islands formed? (9) Where are coral islands found? (10) How are they made? (11) Can you tell of any use that can be made of coral (see *page 22* (12) Can you name any coral islands (see *page 195*)?

SUPPLEMENTARY READING. *Weaver:* Pa Trip to the Moon. *Dodge:* A Reader in Physi Geography, Chapter II. *Slocum:* Sailing Alone Arou the World.

XXVI. THE RACES OF MEN AND THEIR HOMES

How the Races are Named. The Indian, Chinaman, Negro, and the white man differ from one another in the color of the hair and skin, and in the shape and appearance of the features; for this reason they are said to belong to different races or families. One way of naming races is according to the color of the skin; thus, the Chinaman belongs to the yellow race, the Indian to the red race, and the Negro to the black race. Most people of our country belong to the white race. The people who live in the Philippine Islands and in Southeastern Asia belong to the brown race.

Each race has another name derived from the name of the country which is thought to have been its earliest home. A man of the white race is called a Caucasian; of the yellow race, a Mongolian; of the red race, an Indian; of the brown race, a Malay; and of the black race, an Ethiopian, or African. The people of the world are also divided into groups a nations according to languages.

The White Race. The people of t white race are usually tall and strongly bui They have high foreheads, straight nos and thin lips. Their hair is soft and fi and of various colors. Their color depen upon the climate; those who live in h countries are much darker than those w live in temperate or cool countries.

The people of the white race are intel gent, active, and industrious. They we first to have railroads, steamboats, t telephone, and the telegraph. They ha schools and colleges, libraries, picture g leries, theatres, and other places of lear ing and amusement. They live in we built houses, and have many convenienc in their houses that the other races do n have. They have made their way in

ery part of the world and have established lonies wherever they have gone.

GURE 129. A Navajo Indian woman of Arizona and her home. Behind her is a loom, and a blanket partly woven.

The Yellow Race. he home of the yellow ,ce is in Asia. The eople of this race are sually smaller than ıose of the white race. hey have broad faces, gh cheek bones, and anting eyes. They ave short, broad noses, ıd their hair is straight ıd black. The Chiese and the Japanese :e the most important ations belonging to the ellow race. The Chiese are fond of learnıg, and are patient and industrious. They raise cotton, tea, and grains. They were the first people to weave silk from the cocoons of the silkworm, and to make the dishes and vases which are still called *chinaware*.

The Japanese are more active and intelligent than the Chinese. They have been quick to take up the inventions of the white man and to adapt them to their own needs. They send young men and women to other countries to study in the schools and colleges. They use all the latest means of transportation and communication. They have books and libraries, a strong army and navy, and are now considered one of the world's great nations.

The Eskimos also belong to the yellow race. Other members of this race are the Lapps, Finns, and Siberians, who live near the shores of the Arctic Ocean.

The Brown Race. The Malays, or brown race, are a branch of the yellow race. They live in Southeastern Asia and on the neighboring islands. Their hair, eyes, and faces are much like those of the Chinese, but their color is brown. Many of them

FIGURE 130. People of the Philippine Islands engaged in making cigars.

are civilized and have become farmers, mechanics, and merchants.

The Red Race. The native red men of America are called Indians. When white men came to America, the Indians occupied the whole country. The Indians of Mexico and Peru were partly civilized, but those of the other parts of the continent were wandering savages.

FIGURE 131. A Chinese officer.

Most Indians in the United States have now become civilized, and have farms, schools, colleges, and churches. They engage in business and are like white men in all their ways.

The Black Race. We call the black people Negroes from a word meaning black. Their native land is in Africa. Negroes were brought to America three hundred years ago and sold as slaves. After the Civil War the slaves in the United States were made free, and the Negro now engages in business or works for wages just as the white man does. Many of the Negro tribes in Africa are still wild and savage, but the French, English, and German settlers who have gone there to live, are building schools and churches, and are doing much to make the Negroes of Africa like those of the United States.

FIGURE 132. A Christian Negro family of Angola in Africa.

REVIEW. (1) Name some respects in which the races of men differ from one another. (2) Name the five races of men. (3) Describe the white race. (4) How does its manner of life differ from that of other races? (5) Where is the white race found? (6) Name the two leading nations belonging to the yellow race. (7) Tell something about each of these two nations. (8) Name some other members of the yellow race. (9) Where do the Malays live? (10) How do the Indians now live? (11) Describe the manner of life of the Negro in his native land. (12) What is being done to improve his condition?

SUPPLEMENTARY READING. *Starr:* Strange Peoples; American Indians. *Schwartz:* Five Little Strangers. *Shaw:* Big People and Little People of Other Lands. *Andrews:* Seven Little Sisters. *Herbertson:* Man and His Work, Chapter XIV.

PART III. THE CONTINENTS AND COUNTRIES

XXVII. NORTH AMERICA *

What We have Learned. In Section XXV we learned that the surface of the earth is divided into land and water; and that the land consists of six large divisions called continents, and many smaller divisions called islands. We learned also how the great ocean which surrounds the continents is divided, and the names of the various forms of land and water along the seacoast. In our study of Home Geography, we learned that all bodies of land are made up of hills, valleys, mountains, and plains, among which lakes and streams are usually found.

We First Study a Continent as Nature Made It. All the divisions of land and water mentioned in the last paragraph are called **natural divisions** because they were made by the *forces of nature;* that is, by the action of the winds and waters, heat and cold, earthquakes and volcanoes, the rising and sinking of the land, and all other natural agencies by which the surface of the earth is in any way changed. In the first part of this book, we learned many things about the forces of nature, in our study of hills, valleys, mountains, plains, lakes, and rivers, and the various effects of the sun, the rain, and the air in the making and carrying of soil.

We begin our study of the continents and countries with North America because it is the continent on which we live, and, therefore, of greater importance to us than the other continents.

Plants. In the far northern and northeastern parts of North America, there is little plant life. South of the Yukon River, along the southern shores of Hudson Bay,

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HOW TO STUDY THE CONTINENTS AND COUNTRIES. You will find in this book two maps of each continent, one of which is a physical, or *relief*, map, and the other, a *political* map. The first contains the names of the principal natural divisions of the continent, and shows the elevation of the land above sea level; the second shows the countries and cities, as well as the names of the land and water forms. We shall study first the physical map to see how *nature has fitted up the continents as a home for man;* and then we shall study the political map to see *how men have made use of the continents* by dividing them into countries, by building cities in the rich farming and mining regions and along the rivers, lakes, and seacoast, and by improving the means of transportation.

When learning to name and locate land and water forms, countries, and cities, you should have before you an outline map of the continent, and you should write upon the map in the proper place the names that you find mentioned in the text. If you have learned each lesson *well*, you will be able to make an outline map of the continent from memory, and to fill in all the names you have read about. The best way to memorize the location of any place is to *write it down;* indeed, we might say that the best way to help us to remember anything is to WRITE IT DOWN.

Another important thing in our study of maps, is the measurement of distances. You will find on each of the political maps a "scale of miles," which is the same on the relief and political maps of all the continents. This scale is *650 miles to the inch.* To measure the length and breadth of countries, or the distance between two places, you have only to *measure the distance in inches and multiply by 650.* This gives the distance in an "air line." The distance actually traveled on railroads and ships is always greater than the air-line distance.

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* For complete index to *Maps and Map Studies*, see TABLE OF CONTENTS.

and thence eastward to the Atlantic Ocean, begins the evergreen forest belt, which extends south to the Great Lakes. The

FIGURE 133. Position of North America on the globe.

Pacific side of the Western Highlands has a luxuriant growth of forests. The eastern and southern parts of the Central Plain have extensive forests of hard pine.

In the plateau regions between the ranges of the Western Highlands are dry plains where few plants are found except the sage brush and cactus, which are suited to a dry climate on account of the great depth to which their roots penetrate the soil, and because their thick leaves and wiry stalks do not allow the moisture to evaporate. The tropical forests of the hot region afford cabinet woods and fruits. The rubber tree, and the sarsaparilla and the vanilla plants are common species.

Animals. The animals of the colder part of the continent have already been described on page 8. The great evergreen forest belt is the home of the fur-bearing animals. Farther south, before the white man came, the buffalo, the grizzly bear, the cougar, or mountain lion, the elk, the antelope, the mountain sheep, and the wolf were very abundant and are still found. The warm regions are noted for many kinds of birds and insects; alligators, poisonous snakes, and the jaguar are among the dangerous animals of this region.

The Native Races are Indians and Eskimos. The Arctic shores of North America are inhabited by Eskimos, whose manner of life has been described in Section II. The native races of the other parts of the New World are Indians. They comprise many tribes, differing in customs, but with a general likeness in color and feature. The most advanced of the Indian tribes at the time of the discovery of America were the pueblo dwellers of New Mexico and Arizona, and the Aztecs of Mexico.

The pueblo was the dwelling-house for the whole village. It was built of sun-dried bricks, on the sides and summits of a rocky hill, and contained many rooms arranged one above the other. The rooms were entered near the top by means of ladders, which were drawn up so that no enemy could enter.

The Aztecs built large cities, and ornamented their palaces and temples with gold

FIGURE 134. A company of Zuñi priests praying to the gods of war in a Pueblo village in New Mexico.

and silver wrought in curious designs. They had also a system of picture writing, which modern scholars have not yet been able to read.

Politicial Divisions of North America. Let us turn now to the Political Map of North America on page 306. You will notice that it is divided into a number of countries, distinguished by different colors. The largest of these countries are the United States and the Dominion of Canada; Mexico and Alaska are next in size, and to the south and southeast there are a number of smaller countries. As these are the divisions that have been made by men we call them political divisions, or countries.

You will learn in your histories that the white races of North America are descended from Europeans who discovered, explored, and settled the country. As Columbus, the first discoverer of the New World, sailed under the flag of Spain, the parts of the continent which he discovered were settled by Spaniards. The English planted the "thirteen colonies" along the eastern coast of the United States, and the French made settlements in the valley of the St. Lawrence River. And so it happened that the southern part of the continent formerly belonged to Spain, the central part to England, and the northern part to France. Russia discovered Alaska and the Danes discovered Greenland.

History of the Settlements. Many changes have been made in the political divisions of North America since it was first settled by people from Europe. These changes have chiefly been brought about by wars. The first great war was that between England and France, by which the French lost all their colonies in the New World. In 1763, England and Spain ruled nearly the entire continent. These countries, however, ruled their colonies harshly, and finally drove them to rebellion. The English colonies first became dissatisfied with British rule and declared themselves independent in 1776. As a result of the Revolutionary War between the colonies and Great Britain the United States became an independent nation, but England kept possession of Canada.

Spanish Colonies Become Independent. About 50 years after the Revolution, the principal Spanish colonies rebelled and gained their independence of Spain. The last of the Spanish colonies to become independent was Cuba, which with the help of the United States threw off the rule of Spain in 1898. All the Spanish colonies are republics, and their governments are modeled after that of the United States.

Other Changes in Territory. Mexico formerly extended as far north as the Columbia River, and at the beginning of the 19th Century the Mississippi Valley belonged to France, and Florida, to Spain. The United States bought the French and Spanish possessions, and later on, bought Alaska from Russia. A war was fought with Mexico which made the boundary line as you see it on the map. The United States also took possession of Porto Rico after the Spanish War of 1898, and, later, it bought a strip of land across the Isthmus of Panama, through which to build the Panama Canal. Many other changes have been brought about by treaties made with different countries.

North America has a Varied Climate. As North America extends so far north and south it lies in three zones, and the climate ranges from the intense cold of the Arctic regions to the intense heat of the Torrid Zone. The central part of the continent has a temperate climate, and is the most agreeable and healthful part to live in. But climate depends upon many things besides latitude; for example, the high plateaus of the western mountain system are temperate even in the Torrid Zone. The winds from over the warm waters of the Pacific Ocean make the western coast habitable as far north as Alaska; but as the waters of the Arctic and Atlantic Oceans are cold, the northeastern and eastern parts of the continent north of the Labrador Peninsula are unfit for human habitation.

FIGURE 135. Animals of North America.

The greater part of the continent is well supplied with rain; but there is very little on the eastern slopes of the Rocky Mountains or on the plateaus between the mountain regions (see *page 317*).

The Great River Systems. The Mississippi System drains the southern half of the Great Central Plain. The Ohio is its largest tributary from the east, and the Missouri, Arkansas, and Red are the largest from the west. These three rivers have their sources high among the Rocky Mountains. The Mississippi and the Missouri, together, form the longest stream of fresh water on the globe. The St. Lawrence River System is second in importance, and has its source near the source of the Mississippi. This stream carries the water from the Great Lakes, and discharges into the Gulf of St. Lawrence. In the northern part of the continent are the Mackenzie, Yukon, and Saskatchewan Rivers. Each receives numerous tributaries, but on account of the cold climate of the region through which they flow, they are of little use to man. The Columbia and the Colorado are the chief rivers of the western slope.

Lakes. In the central and northern parts of the Central Plain are the great freshwater lakes of the continent. These lakes are found in chains extending from the valley of the St. Lawrence River, northwestward to the Arctic Ocean. Five of the largest, called the **Great Lakes,** form the source of the St. Lawrence River, and others are the sources of the Nelson and the Mackenzie Rivers.

Relief Map. The map on page 308 shows the principal natural divisions of the continent. Notice that the highest parts of the continents (mountains and plateaus) are black or nearly so; that the plains are gray; and that the waters, which are, of course, the lowest parts of the surface, are white. Such a map, as we have learned, is called a *relief* map. (Answer the questions on the RELIEF MAP, *page 308.*)

North America is Very Large and Its Coast Line is Irregular. We know that a degree on the earth's surface is about 69½ miles; and as North America extends from 10° north of the equator to 80° north, it is about 5,000 miles long. Its breadth in the central part is about half its length. It takes the fastest railroad train about 4½ days to cross the continent from east to west; and if a ship could sail around it and follow the windings of the coast, it would take quite as long as it would to make a voyage around the earth.

Turn to page 301 and find out how North America ranks in size with the other continents. On pages 298, 299, we may learn what continents are nearest to it on the northwest and southeast, and in what direction you must go to reach each of the other continents.

Trace the outline of the continent, and you will find that the greater part of the coast is very irregular and that there are several groups of islands and many scattered ones near it.

Mountains and Plains. The western third of the continent consists of a vast system of mountain ranges extending from Bering Strait to the Isthmus of Panama. This highland region is broadest in the central part, where it encloses several plateaus, one of which is called the **Great Basin.** The main range of this system is the Rocky Mountains.

In the eastern part of the continent you find the **Appalachian Highlands,** which follow the direction of the Atlantic Coast and extend from the St. Lawrence River nearly to the Gulf of Mexico.

The **Great Central Plain** lies between the two highland regions. A little to the west of Lake Superior there is an elevation which divides the Central Plain into a northern and southern slope. You can find this "Height of Land" by tracing the divide

FIGURE 136. The Garden of the Gods, Colorado, a wide valley containing rocks worn into curious form

between the rivers that flow north and those that flow south. Along the oceans which border the continents there are several low plains which are called **coast plains;** two of these you will find named on the map.

How Boundaries are Marked. If you study the boundary lines on the map you will notice that some of them consist of rivers and lakes, and that others follow the parallels and meridians. In other cases, as for example, in the northeastern part of the United States and in the southern part of Alaska, the boundary consists of the *highest part of the watersheds* between two slopes. Where bodies of water form the boundaries between two countries, the line runs through the middle of the lake or river, and half of the water surface belongs to one country and half to the other. On land, the boundaries are marked by stone post each side of which is carved the na the country toward which they face.

The boundary lines between countrie be changed at any time the countries make an agreement. As a general thi the people that belong to the same ra speak the same language, inhabit the country; but in most parts of the wor political boundaries are frequently cha You will see, therefore, that there is difference between the study of the *n* divisions of the continents and the *po* divisions: The mountains, rivers, and do not change, or at least, change very sl but the boundaries of countries, the citie the industries and products of the dif countries are constantly changing; in words, the geography of nature is alwa same while the geography of man chang

REVIEW. (1) What is meant by natural divisions? (2) Name some of the natural divisions of land and water. (3) What is meant by a Relief Map? (4) Explain how the different elevations of the land are shown. (5) Describe the size of North America and compare it with the other continents. Which is larger and which, smaller? (6) What is meant by an irregular coast line? (7) is the principal mountain system of North A (8) What mountain system is near the Atlantic (9) Into what two slopes is the Great Central divided? (10) Explain the differences of clim North America. (11) Why does the climate grow

distance north or south of the equator? (12) How nds and ocean waters affect climate? (13) Explain ertain parts of North America have very little rain. What system of rivers drains the southern half of reat Central Plain? What rivers drain the northern (15) What two rivers together form the longest n of fresh water on the globe? (16) Where are the t lakes of North America? (17) Name the five t lakes. (18) What lake is drained by the St. ence River? By the Mackenzie? By the Nelson? In what part of North America are forests found? What kinds of trees are found in the north? In the ? (21) Name some of the larger animals found in ı America. (22) What races are native to North ica? (23) What branches of the Indian race were ıost highly civilized when America was discovered? Name the two largest countries of North America. the other independent countries. (25) By what was America discovered, explored, and settled? What wars have changed the original boundary lines? (27) How did the United States obtain Alaska? Porto Rico? (28) Of what do the boundary lines between countries consist? (29) How may they be changed?

SUGGESTIONS FOR ADDITIONAL WORK. (1) The Discovery of the North Pole. (2) Panama and the Canal. (3) Early Settlements in North America — Spanish — French — English — Dutch. (4) The first white men to visit America. (5) Rivers that cross mountains. (6) Make a list of the important canals of America; tell what they connect and what products they carry. (7) The Hudson Bay Company.

SUPPLEMENTARY READING. *Carpenter and Chamberlain:* Geographical Readers; The World and Its People Series, Book III. *King:* Second Book, Around the World Series; Book Four. *Shaler:* Story of Our Continent. *Lyde:* North America. *McMurry:* Excursions and Lessons in Home Geography. *Rocheleau:* Great American Industry. *Ballou:* Footprints of Travel, Chapters XXV–XXVIII. *Chase* and *Clow:* Stories of Industry. *Hall* and *Chester:* Panama and the Canal.

XXVIII. THE UNITED STATES

(Maps and Studies on *pages 310–317*)

ɔmpared with Other Countries. The ,ed States is the most important coun- in the New World; in the productive- of its farms, mines, and factories, and s enterprise and wealth it is the foremost ll nations. With its dependencies, it ıdes nearly 4,000,000 square miles of tory, making it fourth in size among ɔountries of the world. (See *page 281.*) ɔopulation is exceeded only by that of ıa, the British Empire, and Russia.

ɑpid Growth. The United States is of the youngest nations; yet, owing s rapid growth, it has surpassed many r nations which began over a thousand s ago. At the close of the War of ɔpendence it consisted of the thirteen ɛs along the Atlantic Coast, and the tory westward from them to the Mis- ɔpi River. The people then numbered ıt 3,000,000, most of whom lived near coast and along the great rivers. The ɔn west of the Appalachian Mountains uninhabited except by wandering tribes ndians. By the end of the eighteenth ury the population had spread to the Great Lakes and the Mississippi. Hunters, trappers, and Indian traders had led the way across the mountains and built their cabins in the forest. The pioneers soon followed with their families and goods, and little settlements sprang up which soon grew into prosperous villages and towns. As soon as it had sufficient population the new territory was made into states.

Additions to the United States. In 1803, the "Louisiana Country," lying between the Mississippi River and the Rocky Mountains, was purchased from France. Twenty years later, the states of Louisiana, Arkansas, and Missouri had been formed out of this new territory. Florida was purchased from Spain in 1819, and Texas, having gained its independence, joined the Union in 1845. (See MAP. *page 206.*)

Disputes about the Texas boundary led to a war with Mexico, at the close of which, the land west of the Rocky Mountains known as the "Mexican Cessions," was purchased from Mexico. Soon after the purchase of the Louisiana Territory the United States government sent out the expedition led by Lewis and Clark to explore the new country. They

crossed the Rocky Mountains and descended the Columbia River to the Pacific Ocean, thus gaining a foothold in the extreme Northwest. Companies of emigrants soon followed, and the territory which now forms the states of Washington and Oregon, was occupied.

Early Transportation and Travel. The rapid growth of the United States is due to

FIGURE 137. Hauling cotton bales on a public road.

various causes. In the first place, the earliest settlements were made on the Atlantic Coast, and many rivers that flow into this ocean are navigable for long distances inland. This made it easy for the settlers to extend their settlements *up stream*. They sailed up the Connecticut, the Hudson, the Delaware, the Susquehanna, and the James Rivers, and established colonies.

Several of these rivers have cut their way through the mountains, thus forming natural highways to the great interior plain. The Great Lakes also make it easy to reach the country north of the Ohio River. The Hudson River and the Valley of Central New York formed one of the earliest highways to the Mississippi Valley.

West of the Appalachian Mountains, easy transportation was provided by the Mississippi River and its tributaries, of which the United States gained complete control by the purchase of the Louisiana Territory. The settlers found no barrier to their progress westward, until the Rocky Mountains were reached. It was a difficult task to cross these mountains and the journey could be made only in summer. The difficulty of the journey and the danger of Indian attacks delayed the settlement of the West until gold and other precious metals had been discovered and railroads had been built.

Climate has Favored Growth. The favorable climate of the United States is also an important cause of its rapid growth. The summers are long and warm, and only in the extreme North are the winters very cold. This makes it possible for the farmer to raise a variety of crops, and the usual occupations of men can be carried on out-of-doors throughout the year. Except in the dry regions of the southwest, there is no part of our country in which there is not sufficient rainfall for farming or grazing.

How Farming Began. The fertile soil along the coast and in the river valleys made it easy to raise grains, fruits, and vegetables for a supply of food. The early settlers brought with them from their homes in Europe, horses, cows, sheep, and the seeds and plants necessary to begin farming, gardening, and fruit-growing. The rich natural resources of our country have been developed one by one, and made to contribute to the progress and wealth of the people.

FIGURE 138. A stern-wheel steamboat on a western river. Such steamboats draw only two or three feet of water and are well adapted to the navigation of rivers during the dry season.

Forests and Fisheries were a Source of Wealth. The earliest colonists soon began to turn their attention to the fisheries of the Atlantic Coast, and to the vast forests that covered the country. From the forests

y obtained lumber and timber for ship-
lding, and both lumber and ships were
l to England and other countries. Hun-
ds of vessels were engaged in fishing
l commerce, and the fish, salted or
ed, were taken to the West Indies and
hanged for sugar, molasses, and rum.
ain and tobacco were soon produced
ndantly, and along with timber and fish
e sent to England, and exchanged for
th, iron and steel goods, furniture, and
er things which the colonists needed.

URE 139. The first locomotive built in America, known as Peter Cooper's "Tom Thumb."

Steamboats, Canals, and Railroads. In
ly times the products of the country
e carried by water. Ocean vessels were
n propelled entirely by sails, and river
ft, by sails and oars. The first great
provement in water transportation was
invention of the steamboat, by Robert
ton, in 1807. Steamboats were a great
p to transportation on the rivers of the
ssissippi Valley, as many of the streams
e currents so swift that it is very diffi-
t to make way against them by oars and
s alone.

The next great improvement was the dig-
g of canals. The Erie Canal, connecting the Hudson River with Lake Erie, was completed in 1825, and other canals were soon dug in various parts of the country. The first railroad was built in 1825, at Hoboken, New Jersey. It was only a short one, but it showed the value of rails as an aid to transportation. Other short lines were soon constructed for transporting coal and building-stone.

These first railroads consisted of cars drawn over wooden rails by horses. The steam locomotive and iron rails came into use about 1830, and after this, the development of railroads was rapid. In 1850, there were 9,000 miles. In 1869, the Union Pacific line was completed to the Pacific Coast. There are now within the United States nearly 250,000 miles of railways. Railroads have made lands valuable which lie at a distance from navigable waters, and many cities have grown up which depend entirely upon the railroads for transportation. Other inventions, which are of great value to business and which make travel safe, are the telegraph, the ocean cable, the telephone, and the wireless telegraph.

In Mineral Wealth the United States Surpasses All Other Countries. In the variety and amount of its minerals, no other country in the world is as rich as the United States. Building-stone, clay, salt, petroleum, and iron are found in nearly all the states, and coal is

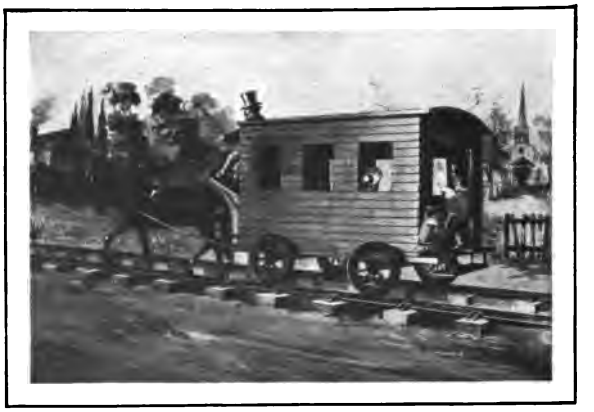


FIGURE 140. A passenger car on the Baltimore & Ohio Railroad in 1830.

mined in thirty of them. In the early times, iron, copper, and a few other minerals were

mined and used in building and manufacturing. In 1848, gold was discovered in California, and soon afterwards, in Colorado and other states. Thousands of people immediately started from the Eastern colonies and from other countries, for the land of gold, and the population of the West soon increased from a few hundreds to hundreds of thousands. Copper, lead, silver, mercury, and other metals were afterwards found, and added greatly to the wealth of the West.

In 1859, an oil well was drilled near Titusville, Pennsylvania, and in the following year, two hundred barrels of petroleum were obtained. The yield had increased in 1891, to 55,000,000 barrels, and in 1912, to 222,000,000 barrels. In the production of coal, iron, copper, and other mineral products there has been a similar increase.

How Population has Increased. The United States was the first country in the history of the world to offer freedom to all. It offers freedom in religion, in education, and in government. All people have equal rights under the law. Immigrants from foreign countries can easily become citizens, and all citizens can take part in governing the country. For these reasons people have flocked to the United States from all parts of the world, and every ship from a foreign port still brings many who come to make their home with us. Immigration has steadily increased since the founding of our government, and now amounts to about 1,000,000 persons a year. The greater part of these have come from the British Isles, Germany, Italy, Russia, Austria, and the Scandinavian countries, but many have come from the other countries of Europe, and from all parts of Asia as well.

Most of the immigrants land at New York City, and about one-third of these remain there; the rest continue their journey to other states. Many settle in the North Central States and become farmers. Others who are skilled laborers work at their different trades in the cities. A great many find employment in helping to build the railroads and other public works of the country. It has been due chiefly to immigration that the United States has grown so rapidly in population and wealth. Every industrious citizen adds something to the general wealth of the country by helping to make or produce things which have value. He may make a pair of shoes or a suit of clothes, he may dig metals out of the earth or he may help to build a railroad, but in every case, he helps to make something which is of permanent value and which increases the wealth and prosperity of our country.

Physical Divisions of United States. We have learned from our study of the RELIEF MAP (*page 312*), that the United States consists of five great natural divisions. **The Great Central Plain** is the largest and most important of these. Its eastern boundary is the Appalachian Highlands, and its Western boundary, the Rocky Mountains. On both the eastern and western borders there are elevated regions which we call plateaus. The western plateau region, known as the **Great Plains,** has a dry climate and is famous for stock-raising. The northern part of the Central Plain has a moderate rainfall and produces great quantities of hay, grain, and other field crops. A part of this region bordering the Great Lakes is known as the **Lake Plain** and is well adapted to fruit-growing. South of the Great Lakes and extending westward to the border of the Great Plains are the **prairies,** with their deep rich soil. The southern part of the Central Plain, from the mouth of the Ohio River to the Gulf of Mexico, has a warm and moist climate. Much of the land bordering the gulf and the lower courses of the Mississippi River consists of low, swampy ground, suitable for the cultivation of sugar and rice, while the uplands and alluvial plains form the chief cotton-growing region of the world.

The Mississippi River System. If you look at the RELIEF MAP of the United States on page 312, you will see that the Central Plain is intersected by a vast number of

rivers. Nearly all these rivers flow either into the Mississippi or the Missouri, which are the main streams of the Mississippi River System. The distance from the mouth of the Mississippi to the source of the Missouri is 4,200 miles. This is nearly 1,000 miles greater than the length of the river Nile in Africa, which is the second longest river in the world.

The largest branches of the Mississippi-Missouri system are shown on the map, but there are hundreds of smaller ones, which the map does not give. Most of them rise

FIGURE 141. The Mississipi River System.

in the Appalachian or in the Rocky Mountains. As the Great Central Plain is so nearly level, all the larger streams are navigable for steamboats and small vessels, and thousands of these are busily engaged in transporting farm products to the coast or in distributing coal, iron, lumber, oil, and other raw materials to the great manufacturing cities.

In the spring of the year, when the snow is melting among the mountains and the rainfall is heavy, the tributaries of the Mississippi and the Missouri bring down such floods of water that the main streams overflow and cause destruction of life and property. Such overflows are prevented by building walls of earth and stone along the rivers where the banks are low. These walls are called **levees,** and they extend along the lower course of the Mississippi for hundreds of miles.

It is thought that a series of great dams should be built along the upper courses of the Mississippi and its branches, to store up the flood of water, which could then be used for power, irrigation, or for any other purpose required. One such dam has been built at Keokuk near the mouth of the Des Moines River, which is the largest power dam in the world. Many more such dams will, no doubt, be built in the future.

At the mouth of the Mississippi River, a delta has been formed in the gulf, by the sediment carried down by the stream. At the head of the delta the river divides into several channels which are called "passes." One of these passes is kept open for ships by walls known as "jetties" built along its sides. These walls confine the water to the channel and cause the current to flow so swiftly that the mud is carried far out into the Gulf, thus keeping the channel deep enough for navigation.

The Atlantic Slope. This region lies east of the Appalachian Highlands, and slopes gradually to the ocean and to the Gulf of Mexico. It is narrowest in the northern part, but toward the south increases to several hundred miles in breadth. It has a mild and moist climate, and produces grain, fruits, and vegetables. That part of the Atlantic Slope which borders on the ocean and the Gulf of Mexico is called the Coast Plain. Much of it is low and sandy, and covered with swamps and pine forests. Further inland the land is higher and better adapted to farming. The Coast Plain is crossed by many rivers which rise in the Appalachian Highlands and flow in a southeasterly direction. Most of these rivers are navigable and their mouths form good harbors.

The Appalachian Highlands, with the plateaus on either side, have a breadth of about three hundred miles. This region is

famous for its mineral wealth. In the northern section are quarries of granite, marble, slate, and graphite. In the central section, coal and petroleum are the chief mineral products. Further south, marble, coal, iron, and other minerals are found. The entire Appalachian region is devoted largely to the manufacture of iron and steel.

The Plateau Region. This division contains the highest mountains and plateaus in the country. On its eastern border is the Rocky Mountain System, which forms a great dividing ridge between the Atlantic and Pacific Oceans. On its western border are the Sierra Nevada and the Cascade Mountains. Between these bordering mountains is a region of plateaus, which is the driest section of the United States.

The plateau region is famous for its mines of gold, silver, copper, lead, and coal. Owing to its dry climate, it is suitable for sheep-raising. During the last twenty-five yea great progress has been made in storing the water of the rivers in vast reservoirs, use in watering the crops. When irrigated this way, the land becomes very fertile, and especially fitted for fruit-growing.

The Pacific Slope. This region lies betwe the Sierra Nevada Range and the Paci Ocean. The northern half has the heavi rainfall in the country, but toward the sou the climate becomes drier, until in the treme southern part we come to a regi which has the least annual rainfall to found on the continent. Owing to the abu dant rain of the northern section, the weste slopes of the mountains are covered wi forests of the heaviest timber in the wor The inlets and rivers abound in salmon a other fish. The drier and warmer sou ern section, with the help of irrigation, h become famous for fruit-growing.

REVIEW. (1) In what does the United States surpass other countries? (2) What is its area and population including its dependencies? (3) Compare the area and the population of the United States with those of China, Russia, and Great Britain. (See *page 281.*) (4) Compare the present area and population with those of the thirteen states at the close of the Revolution. (5) Name the various additions which have been made to the territory of the United States. (6) Why was it easy for the early colonists along the Atlantic Coast to extend their settlements inland? (7) How did the Mississippi River System help the settlement of the Central Plain? (8) Why is the climate of the United States favorable to the farmer? (9) In what sections is the most fertile soil found? (10) Where were domestic animals and useful plants first obtained by the early colonists? (11) How did they make use of the forests and fisheries? (12) What minerals are the most abundant in the United States? (13) What metals are mined in the Western Highlands? (14) Where was petroleum first found? (15) Tell something about the increase in its production. (16) What were the earliest means of transportation? (17) When was the steamboat invented? How did it help transportation in the West? (18) When was the locomotive invented? (19) When was the first canal dug in our country? (20) Describe the early railroads. (21) Tell something about the increase of railroads the United States. (22) Why are telegraph, telephc and other means of rapid communication useful in bi ness? (23) In what way is the government of the Uni States a free government? (24) Name the five gr natural divisions of the United States. (25) What the chief industries of the Great Plains? Of the L Plain? (26) How does the southern part of the Gr Central Plain differ from the northern part? (27) Na its chief rivers. (28) Where is the Atlantic Plain? (Describe its rivers and chief productions. (30) Descr the extent and mineral wealth of the Appalachian Hi lands. (31) Give the boundaries of the Plateau Regi Describe its climate and productions. (32) Where is Pacific Slope? (33) How does the climate of the north part differ from that of the southern part? (34) what products is the Pacific Slope noted? (35) On outline map of the United States mark off the physi divisions named in this chapter and write the chief p ducts of each.

SUPPLEMENTARY READING. *Wright:* Sto of American History; Stories of American Progr *Allen:* Industrial Studies. *Gordy:* American Leaders Heroes; School Histories of the United States. *Bright* From Trail to Railway. See also references on No America, page 112.

INDEX AND PRONUNCIATIONS

Key to the Diacritical Marks (From Webster's International Dictionary):—**A:** ă, as in ăt; ā, as in āle; ä, as in ärm; å, as in senâte; *a*, as in sof*a*; *ă*, as in *ă*ccount; ȧ, as in ȧsk; â, as in câre. **E:** ĕ, as in ĕnd; ē, as in ēve; ê, as in êvent; ẽ, as in fẽrn; *ĕ*, as in rec*ĕ*nt. **I:** ĭ, as in īce; ĭ, as in ĭll. **O:** ō, as in ōld; ŏ, as in ŏdd; ô, as in ôbey; ȯ, as in ȯrb; *ŏ*, as in c*ŏ*nnect. **U:** ū, as in ūse; ŭ, as in ŭp; û, as in ûrn; *ŭ*, as in circ*ŭ*s; ů, as in ůnite. **OO:** o͞o, as in food; o͝o, as in foot. **OU:** ou, as in out. **OI:** oi, as in oil. **G:** g, as in go. **CH:** ch, as in chair. **N:** ŋ, as in iŋk. **NG:** ng, as in sing. **TH:** th, as in then; th, as in thin. **Y:** y, as in yet. **ZH:** z, as in azure. The primary accent is indicated by the mark (′).

All numbers refer to pages; when in parentheses they refer to illustrations; where several references are given the main treatment is indicated by heavy type.

APPENDIX

BOOKS FOR REFERENCE

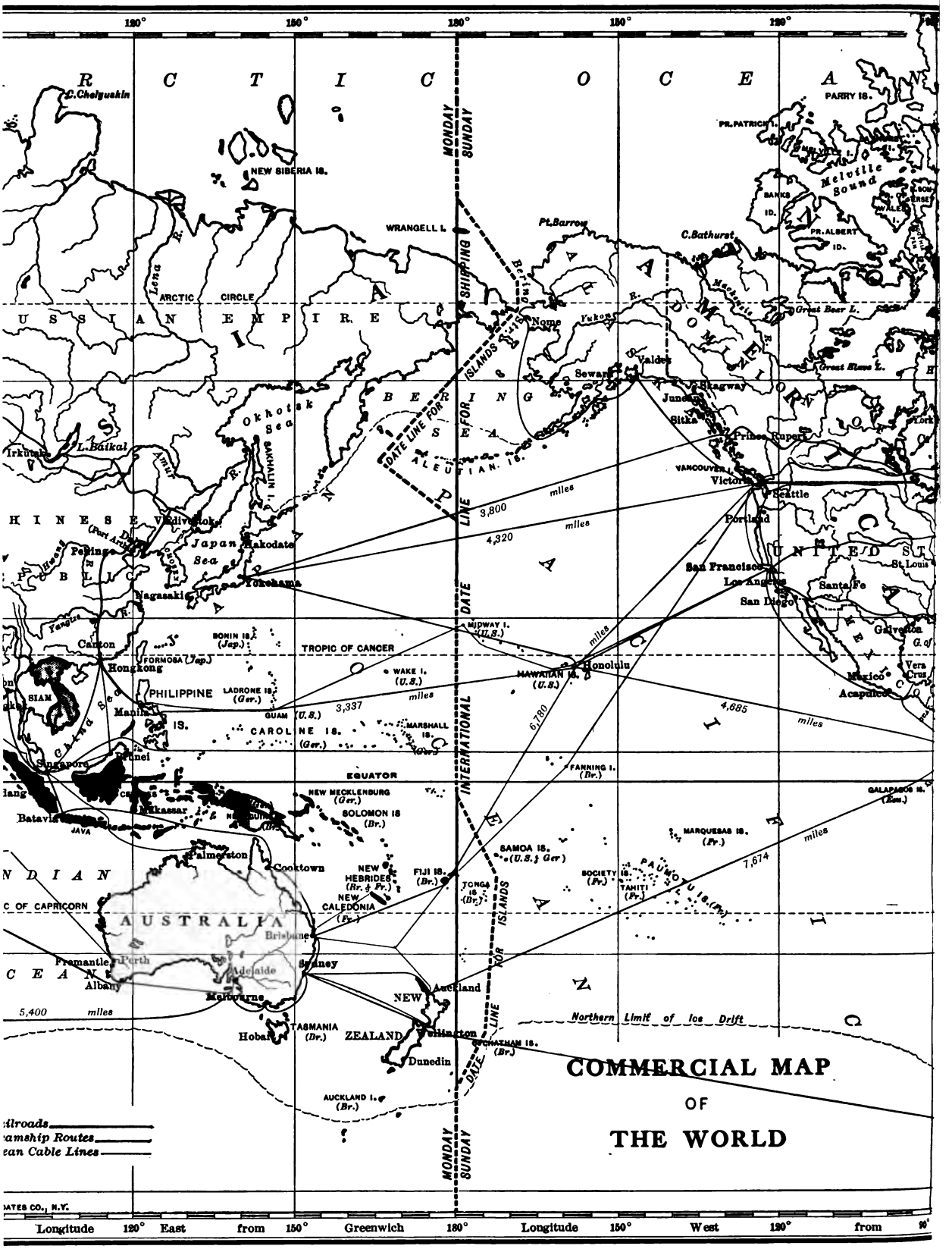
The names of publishers are abbreviated as follows: A. B. C., American Book Co., New York; E. P. C., Educational Publishing Co., Boston; E. P. D., E. P. Dutton Co., New York; App., D. Appleton & Co., New York; Ginn, Ginn & Co., Boston; Heath, D. C. Heath & Co., Boston; McC., A. C. McClurg & Co., Chicago; McM., The Macmillan Co., New York; Scrib., Charles Scribner's Sons, New York; S. B. C., Silver, Burdett & Co., Boston; R. Mc., Rand, McNally & Co., Chicago; L. G., Longmans, Green & Co., New York; L. B., Little, Brown & Co., Boston; L. S., Lothrop, Lee & Shepard, Boston; Lipp., J. B. Lippincott Co., Philadelphia; A. M. & Co., Atkinson, Mentzer & Co., Chicago; Revell, Fleming H. Revell, New York; Harper, Harper Brothers, New York; Stokes, F. A. Stokes & Co., New York.

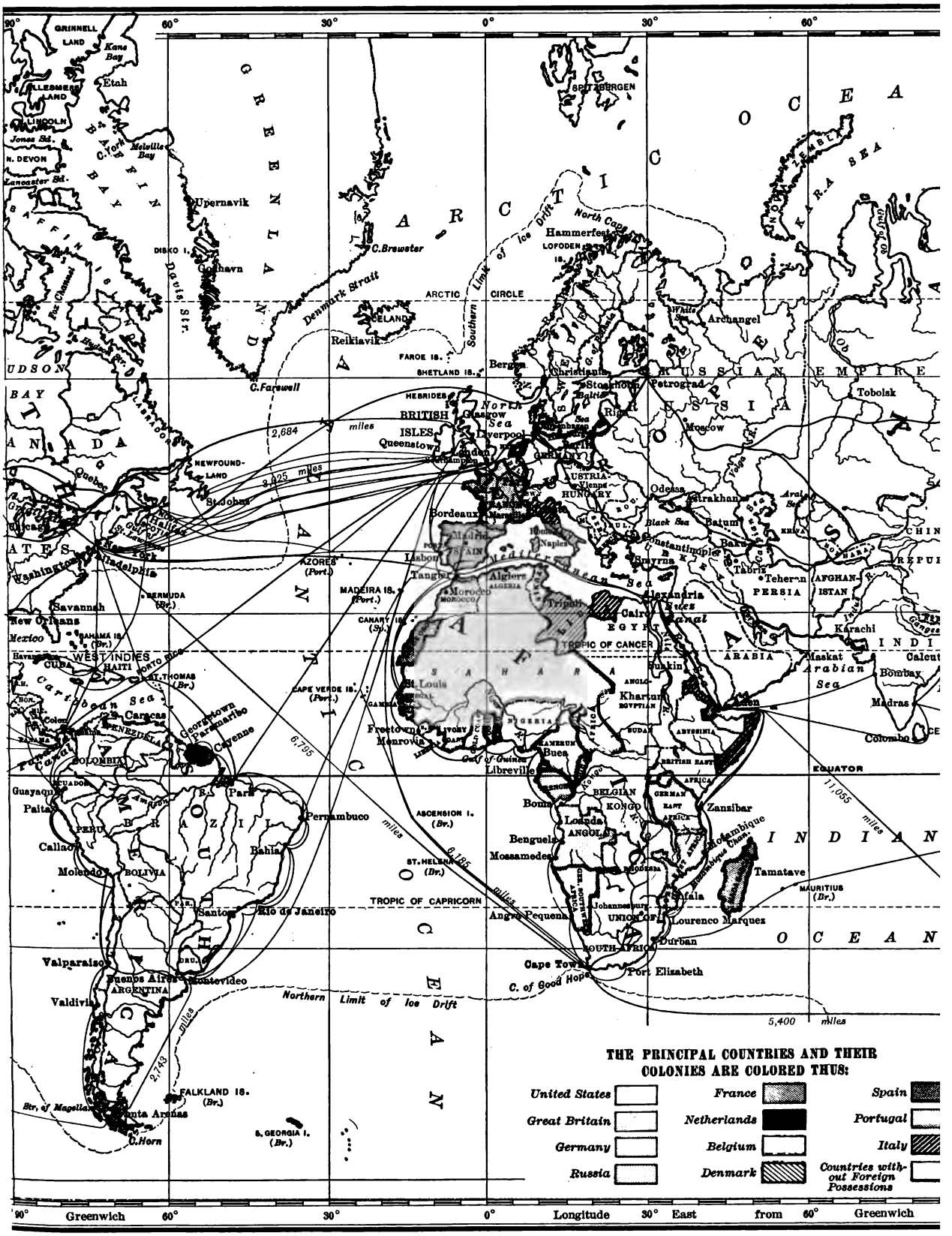
Books and Aids for Teachers: *Mill:* International Geography (App., $3.50); *Chisholm:* Commercial Geography (L. G., $4.80); *Keltie:* The Statesman's Year Book (McM., $2.50). This book gives the latest information concerning reigning houses, government officials, forms of government, boundaries, races, religions, land and naval forces, and statistics of production, trade, and population. *Journal of Geography*, University of Wisconsin, Madison, Wis. ($1.00 a year); *National Geographic Magazine*, Washington, D. C. ($2.50 a year); *Pan-American Bulletin*, Washington, D. C. ($2.00 a year); *McMurry:* Special Method in Geography (McM., 70¢); *King:* Methods and Aids in Geography (L. S., $1.20); *Geikie:* The Teaching of Geography (McM., 60¢); *Trotter:* Lessons in the New Geography (Heath, $1.00); *Mill:* Hints to Teachers and Students on the Choice of Geographical Books (L. G., $1.25).

Valuable lists of reference books may be found in *King's* "Methods and Aids," *McMurry's* "Special Method," and Journal of Geography for Jan., 1915. For exhaustive lists, see the "Cumulative Index," the "United States Catalogue," and the publishers' catalogues. Railroad folders and tourists' booklets are of great value and of endless variety; most of them may be secured by writing to the various transportation companies at home and abroad. The publications of the United States Government cover a vast field, and information may be secured by writing to the Superintendent of Public Documents, Washington, D. C. The officials of the several state governments will on request supply a variety of material respecting their states.

SUPPLEMENTARY READING

Author	*Title*	*Publisher*	*Price*
Allen	Industrial Studies	Ginn	65¢
Ambrosi	When I Was a Girl in Italy	L. S.	75¢
Andrews	Each and All; Seven Little Sisters; Stories Mother Nature Told Her Children	Ginn	50¢
Avebury	The Beauties of Nature	McM.	$1.
Ayrton	Child Life in Japan	Heath	2
Badlam	Views in Africa	S. B. C.	6
Ballou	Footprints of Travel	Ginn	6
Boyesen	Boyhood Days in Norway	Scrib.	$1.
Brigham	From Trail to Railway	Ginn	5
Brooks	The Mediterranean Trip	Scrib.	$1.
Browne	Panama	McM.	7
Cantlie and Jones	Sun Yat Sen	Revell	$1.
Carpenter	How The World is Fed; How the World is Housed; How the World is Clothed; Geographical Readers (6 Vols.)	A. B. C.	60¢
Carroll	Around the World Series (6 Vols.)	S. B. C.	60¢
Carson	Mexico	McM.	$2.
Chaillu	Land of the Midnight Sun	Harper	5.
Chamberlain	How We Are Fed; How We Are Clothed; How We Are Sheltered; How We Travel		40¢
	The Continents and Their People (6 Vols.)	McM.	55¢
Chase and Clow	Stories of Industry (2 Vols.)	E. P. C.	40¢
Coe	Founders of Our Country	A. B. C.	5
	Our American Neighbors; Modern Europe	S. B. C.	60¢
D'Anvers	Science Ladders	E. P. C.	4
Demetrios	When I Was a Boy in Greece	L. S.	7
Dodge	A Reader in Physical Geography	L. G.	7
Dodge	Hans Brinker	Scrib.	$1.
Dutton	In Field and Pasture	A. B. C.	3
Eggleston	Stories of American Life and Adventure	A. B. C.	5
Fairbanks	Home Geography for Primary Grades	E. P. C.	6
Fairbanks	Western United States.	Heath	6
Finnemore	England; France	McM.	55¢
Frye	Brooks and Brook Basins	Ginn	5
Gee	Short Studies in Nature Knowledge	McM.	$1.





hor	*Title*	*Publisher*	*Price*
ly	American Leaders and Heroes	Scrib.	60¢
e	Seven Spanish Cities	L. B.	$1.25
! and Chester	Panama and the Canal	Newson	60¢
bertson	The British Empire	McM.	75¢
	Man and His Work	McM.	60¢
len	The Earth and Sky	App.	28¢
ton	The Frozen North	Heath	40¢
chinson	The Story of the Hills	McM.	60¢
cson	Astronomical Geography	A. B. C.	25¢
lan	Science Sketches	McC.	$1.00
el	When I Was a Boy in Palestine	L. S.	75¢
ogg	Australia and Islands of the Sea	S. B. C.	68¢
y	Leaves from Nature's Story Book	E. P. C.	40¢
g	The Soil	McM.	$1.25
g	Geog. Readers, Book I	L. S.	50¢
	Book II	L. S.	72¢
	Books III–V	L. S.	56¢ ea.
	Book VI	L. S.	60¢
gsley	Madam How and Lady Why	McM.	50¢
ling	Jungle Book	Cent.	$1.50
e	Toward the Rising Sun	Ginn	25¢
g	Home Geography	A. B. C.	25¢
gman	Pictorial Geographical Reader	L. G.	36¢
s	Man and His Markets; North America	McM.	50¢ ea.
bock	The Scenery of Switzerland	McM.	$1.50
Clintock	The Philippines	A. B. C.	40¢
tineau	Feats on the Fiord	E. P. D.	75¢
Donald and Dalrymple	Betty in Cannada; Manuel in Mexico; Donald in Scotland; Kathleen in Ireland; Fritz in Germany; Colette in France; Rafael in Italy; Boris in Russia; Gerda in Sweden; Martha in Holland; Josefa in Spain; Chandra in India; Um San in Japan	L. B.	60¢ ea.
furry	Excursions and Lessons in Home Geography	McM.	50¢
kin	Russia	Lipp.	$4.00
r	Little People of Asia	E. P. D.	$2.50
r and Davis	Geog. New York City	H. N. E.	50¢
tgomery	Beginner's American History	Ginn	60¢ ea.
-is	Home Life in All Lands (3 Vols.)	Lipp.	60¢
Murché	Science Readers, Books I and II	McM.	25¢ ea.
	Books III and IV	McM.	40¢ ea.
	Books V, VI, and VII.	McM.	50¢ ea.
Niver	Stories of the Farm	A. M. & Co.	25¢
	Stories of Common Things	A. M. & Co.	25¢
	Great Names and Nations	A. M. & Co.	60¢
	School History of England	A. B. C.	90¢
Parker and Helm	Uncle Robert's Geography	App.	50¢
Payne	Geographical Nature Studies	A. B. C.	25¢
Perdue and La Victoire	Child Life in Many Lands	R. Mc.	25¢
Perry	With Azir Girges in Egypt	A. M. & Co.	40¢
Porter	The Stars in Song and Legend	Ginn	60¢
Pratt	American History Stories	E. P. C.	36¢
	Stories of India	E. P. C.	40¢
Proctor	Stories of Star Land; Giant Sun and His Family	S. B. & Co.	50¢ ea.
Redway	Manual of Geography.	Heath	65¢
Reynolds	How Man Conquered Nature	McM.	40¢
Rocheleau	Great American Industries (3 Vols.)	Flanagan	50¢ ea.
Schwartz	Five Little Strangers	A. B. C.	40¢
Schwatka	The Children of the Cold	E. P. C.	$1.25
Shaler	Story of our Continent	Ginn	75¢
	First Book in Geology.	Heath	60¢
Shaw	Big People and Little People of Other Lands	A. B. C.	30¢
Shioya	When I was a Boy in Japan	L. S.	75¢
Sidgwick	Germany	McM.	55¢
Siepen	Berlin	McM.	55¢
Slocum	Sailing Alone Around the World	Cent.	$1.25
Smith	Life in Asia	S. B. C.	60¢
Spencer	The World's Minerals.	Stokes	$2.00
Stanley	The Kongo	Harper	$7.50
Starr	Strange Peoples	Heath	40¢
Stickney	Earth and Sky	Ginn	30¢
Strong	All the Year Round (3 Vols.)	Ginn	30¢ ea.
Tarr	Elementary Geology	McM.	$1.40
	New Physical Geography	McM.	1.00
Wallace	Russia	McM.	5.00
	The Malay Archipelago	McM.	2.00
Weaver	Paul's Trip to the Moon	Merrill	25¢
Whymper	Scrambles Among the Alps	Scrib.	$6.00

Author	*Title*	*Publisher*	*Price*
Williams	Paris	McM.	75¢
Wilson	Nature Study in Elementary Schools	McM.	35¢
Winslow	The United States	Heath	50¢
Wright	Stories of American History; Stories of American Progress	Scrib.	$1.25 ea.
Yan Phou Lee	When I was a Boy in China	L. S.	
Youth's Companion Series	Northern Europe; Strange Lands Near Home; The Wide World; Toward the Rising Sun; Under Sunny Skies	Ginn	25¢

STATISTICS

NOTE. — The chief authorities for the statistics which follow, are the reports of the United States Census Bureau and the Government surveys, the Statesman's Year Book, Young's General Astronomy, Whittaker's Almanac, the World Almanac, and the results of the work of eminent men of science, such as Supan, Clarke, and others. It should be borne in mind, however, that the best authorities sometimes differ, and that many statistics are merely estimates. In cases where no dates are given, the figures are the most recent obtainable. In using statistical tables of any kind the two important considerations are, the *authority* and the *date*. Statistics of population and production are of necessity continually changing, and terrestrial measurements vary according to the accuracy of the surveyor or the mathematician.

DIMENSIONS OF THE EARTH

	Miles
Polar Diameter	7,900
Equatorial Diameter	7,926
Length of the Equator	24,902
Length of a Meridian Circle	24,857
Length of a Degree of Latitude at the Equator	68.70
Length of a Degree of Latitude at the Poles	69.40
Average Length of a Degree of Latitude	69.00
Length of a Degree of Longitude at the Equator	69.20
Length of a Degree of Longitude 20° North or South	65.00
Length of a Degree of Longitude 40° North or South	53.06
Length of a Degree of Longitude 60° North or South	34.67
Length of a Degree of Longitude 80° North or South	12.05
Length of a Degree of Longitude 90° North or South	0.00

AREA AND POPULATION

	Square Miles
Total Area of the Earth's Surface	197,000,000
Total Area of the Land Surface	57,641,105
Total Area of the Water Surface	149,358,895
Total Area of the Pacific Ocean	68,634,000
Total Area of the Atlantic Ocean	41,321,000
Total Area of the Indian Ocean	29,430,000
Total Area of the Arctic Ocean	4,781,000
Antarctic Ocean (undetermined)	

Continents	*Area in Square Miles*	*Populat*
Africa	11,513,579	120,000,(
Asia	17,057,666	825,000,(
North America	8,037,714	130,000,(
South America	6,851,306	56,000,(
Europe	3,754,282	455,000,(
Australasia	3,456,290	7,000,(
Polar Regions	6,970,268	300,(
Total	57,641,105	1,592,300,(

THE GREATEST OCEAN DEPTHS

Pacific Ocean	32,088 f
Atlantic Ocean	27,972
Indian Ocean	21,968
Southern Ocean	25,200
Arctic Ocean	9,000

HIGHEST AND LOWEST POINTS ON THE CONTINENTS

Highest Points:

Asia, Mount Everest	29,002 f
South America, Mount Aconcagua	23,080
North America, Mount McKinley	20,464
Africa, Kibo Peak	19,320
Europe, Mount Elbruz	18,200
Australia, Mount Kosciusko	7,328

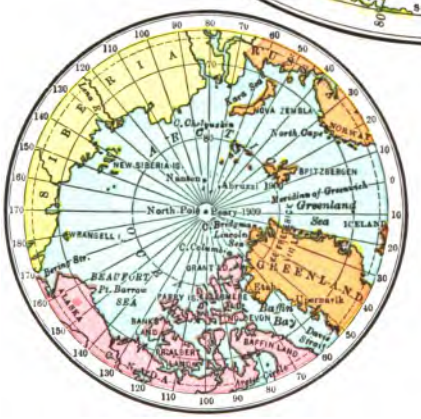
Lowest Points:

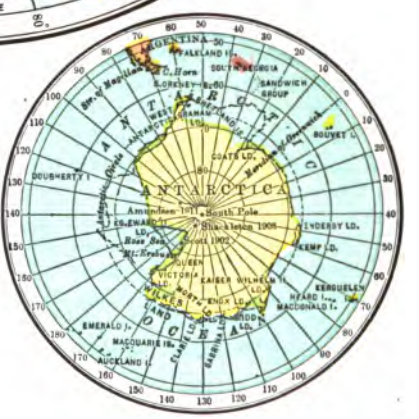
Asia, Dead Sea	1290 feet below sea le
North America, Death Valley (Cal.)	276 feet below sea le
Africa, Desert of Sahara	150 feet below sea le
Europe, Caspian Sea	86 feet below sea le
Australia, Lake Torrens	25 feet below sea le
South America (not determined).	

AREA OF LAKES AND INLAND SEAS

	Area Square M
Caspian Sea	168,(
Victoria	32,(

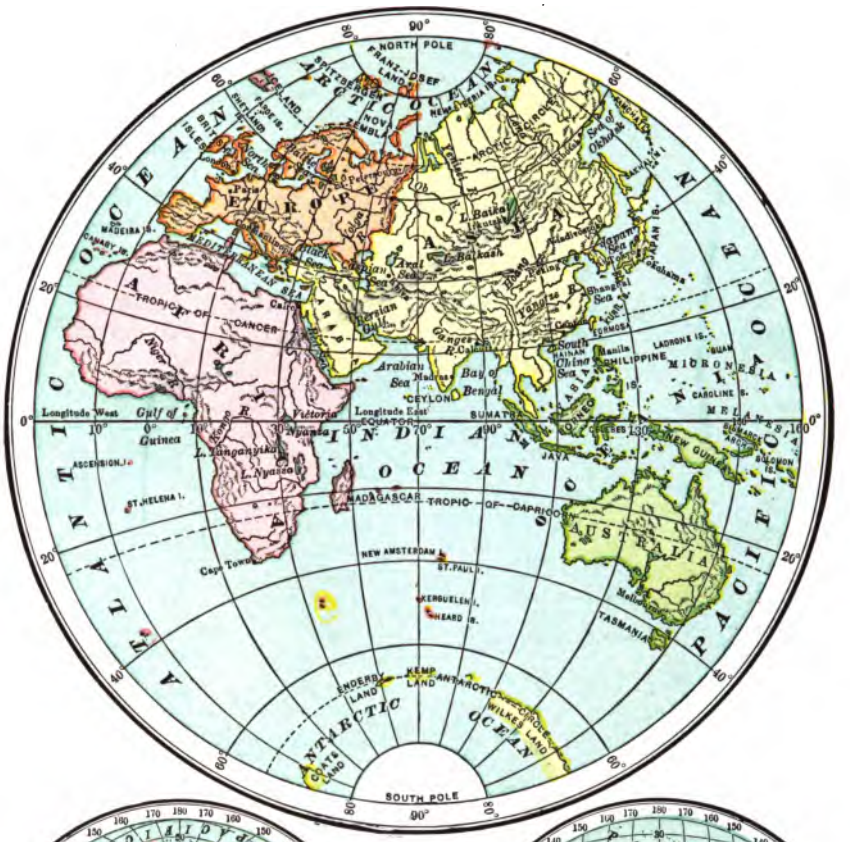
WESTERN HEMISPHERE





AP STUDIES. (1) Name the continents of the ern Hemisphere. Point out the isthmus that con- them. (2) What four oceans do you find on this Which is largest? (3) Find some of the straits, ls, peninsulas, and capes shown on this page. (4) e some of the seas, gulfs, bays, and rivers. (5) Who first reached the North Pole? The South Pole? (6) What name has been given to the South Polar continent? (7) What can you tell about Nansen, Scott, or other explorers of the Polar Regions? (8) Of what countries are Peary and Amundsen citizens? (9) Why is the new continent at the South Pole of no value to mankind?

EASTERN HEMISPHERE



LAND HEMISPHERE

WATER HEMISPHERE

MAP STUDIES. (1) Name the four land divisions of the Eastern Hemisphere. (2) Which two divisions form one land-mass or continent? (3) Which continent is an island? (4) Name five other large islands. (5) What oceans do you find on this map? (6) Name a large sea; a gulf; a bay. (7) Point out a strait; a peninsula; a lake; a river. (8) How are mountains re sented on the map? (9) What continent is crossed by Equator? Which are crossed by the Tropic of Can By the Tropic of Capricorn? (10) Can you tell in w zone or zones each of the land divisions is located? What land mass is entirely within the Water Hemisph

APPENDIX

LAKES AND INLAND SEAS

	Area in Square Miles
·ior	31,200
Sea	26,766
n	23,800
igan	22,450
	9,960
rio	7,240
t Salt Lake	2,300
Sea	353

ENGTH OF RIVERS AND BASIN AREAS

	Length in Miles	Basin Area in Square Miles
ssippi	4,200	1,250,000
	3,900	1,300,000
zon	3,400	2,320,000
;tze	3,100	690,000
sei	3,000	1,500,000
	3,000	1,100,000
r	2,900	1,000,000
go	2,800	1,500,000
	2,800	900,000
ıg	2,800	390,000
r	2,700	780,000
ong	2,600	280,000
	2,500	1,150,000
a	2,300	590,000
awrence	2,100	565,000

EIGHTS OF THE PRINCIPAL MOUNTAIN PEAKS

	Feet
Everest, Himalaya Mts., Asia	29,002
Aconcagua, Andes Mts., Chile	22,860
McKinley, Alaska	20,464
Logan, Coast Ranges, Canada	19,539
Demavend (vol.), Persia	18,846
Orizaba, Mexico	18,314
Elbruz, Caucasus Mts., Russia	18,200
St. Elias, Alaska	18,025
Kenia, Africa	18,000
Popocatepetl (vol.), Mexico	17,784
Blanc, Alps Mts., France	15,782
Whitney, Sierra Nevada Mts., California	14,501
Rainier, Cascade Mts., Washington	14,408
Elbert, Rocky Mts., Colorado	14,402
Shasta, Cascade Mts., California	14,380
na Kea, Hawaiian Islands	13,823
Fujiyama, Japan	12,365
Etna (vol.), Sicily	10,874
Mitchell, Appalachians, North Carolina	6,711
Washington, White Mts., New Hampshire	6,279
Marcy, Adirondack Mts., New York	5,344

THE CONTINENTS AND COUNTRIES

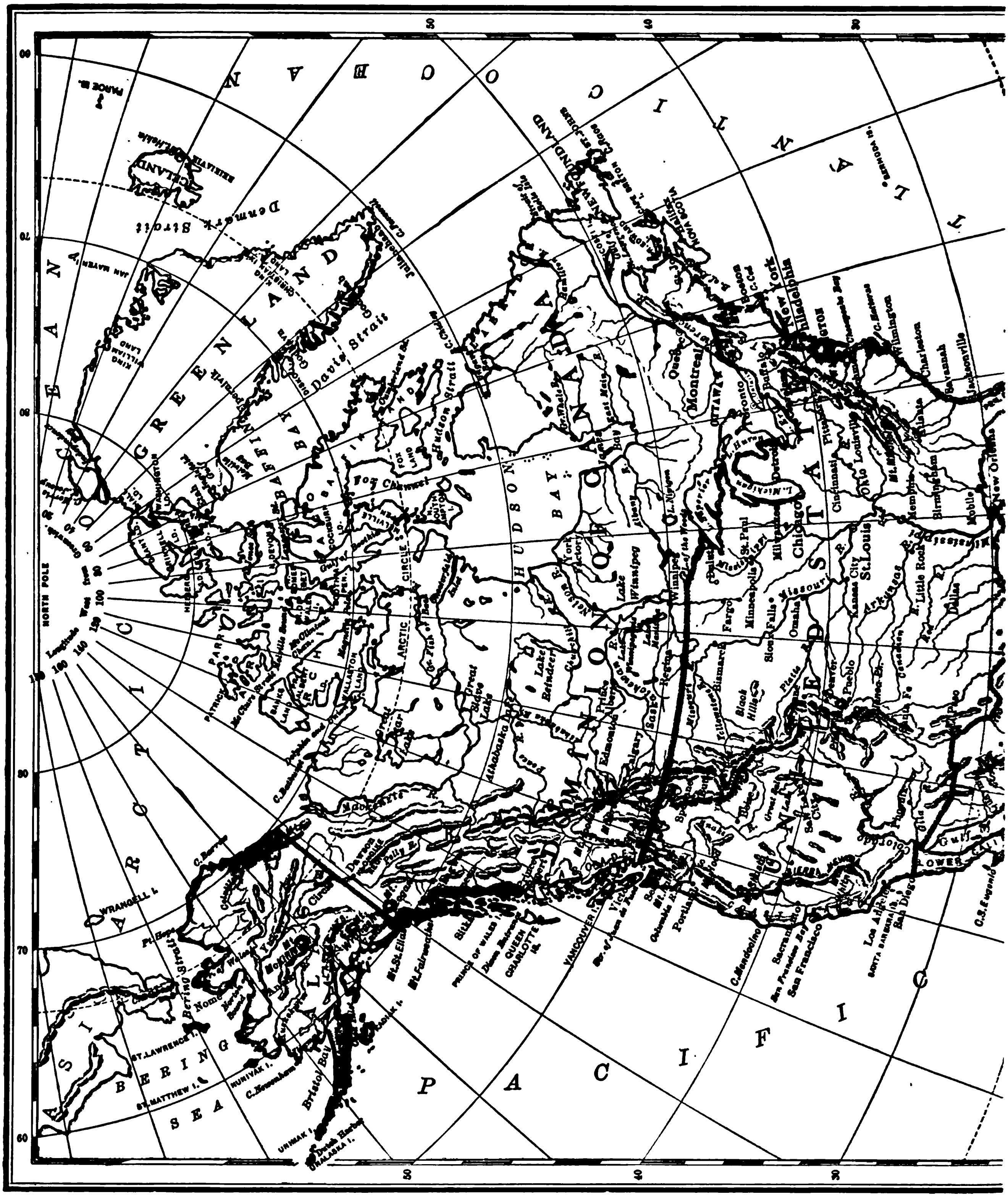
	Area in Square Miles	Population
North America:		
United States and Possessions	3,743,306	101,100,000
Canada	3,729,665	7,185,000
Newfoundland and Labrador	163,000	243,000
Mexico	765,535	15,063,207
Cuba	44,164	2,100,000
Panama	32,380	386,745
Costa Rica	23,000	399,400
Honduras	46,250	553,446
Nicaragua	49,200	600,000
Guatemala	48,290	1,992,000
Salvador	7,225	1,200,000
South America:		
Brazil	3,218,130	24,000,000
Argentina	1,153,418	9,000,000
Chile	291,500	4,000,000
Venezuela	394,000	2,743,841
Colombia	461,606	5,474,961
Ecuador	120,000	1,500,000
Peru	697,640	4,500,000
Bolivia	709,000	2,267,935
Uruguay	72,210	1,111,758
Paraguay	97,700	800,000
British Guiana	90,300	310,000
French Guiana	34,060	48,800
Dutch Guiana	46,060	85,402
Europe:		
England and Wales	58,575	34,488,233
Scotland	30,433	4,738,300
Ireland	32,373	4,384,710
United Kingdom (total)	121,391	43,611,243
German Empire	208,780	64,925,993
France	207,054	39,601,509
Russia	1,996,743	160,100,000
Austria-Hungary	260,034	50,000,000
Italy	110,623	35,240,000
Netherlands	12,648	6,102,000
Belgium	11,373	7,432,784
Switzerland	15,976	3,741,971
Norway	124,129	2,302,698
Sweden	172,876	5,476,441
Denmark	15,388	2,775,076
Spain	190,050	19,588,688
Portugal	35,490	5,957,985
Greece	46,552	4,500,000
Roumania	54,000	7,520,000
Bulgaria	43,000	4,755,000
Serbia	34,000	4,600,000
Montenegro	5,650	520,000
Albania	11,000	825,000
Turkey	11,000	1,892,000

	Area in Square Miles	Population
Asia:		
China	4,000,000	333,500,000
Japanese Empire	258,266	71,759,930
British India	1,925,500	319,100,000
Asiatic Turkey	699,224	19,382,000
Siberia	4,786,730	7,838,500
Persia	628,000	10,000,000
Afghanistan	250,000	5,000,000
Siam	220,000	6,000,000
French Colonies	310,176	16,594,000
Dutch East Indies	402,999	34,626,418
Africa:		
Egypt	400,000	11,400,000
Abyssinia	350,000	7,000,000
Liberia	41,000	2,060,000
Madagascar	227,000	2,505,000
Kongo Free State	900,000	9,005,465
Union of South Africa	473,200	5,980,000
Algeria	194,550	5,600,000
Tunis	51,000	1,900,000
Libia	410,000	1,000,000
Rhodesia	450,000	1,750,000
British East Africa	182,000	4,000,000
Total French Colonies	4,421,934	25,960,000
Total German Colonies	931,460	13,419,500
Total British Colonies	3,875,677	50,248,650
Total Italian Colonies	596,000	1,800,000
Total Portuguese Colonies	823,334	8,004,655
Total Spanish Colonies	85,814	235,841
Australia:		
Victoria	88,000	1,320,000
New South Wales	310,400	1,650,000
Queensland	670,500	606,000
South Australia	904,000	409,000
West Australia	976,000	282,000
Tasmania	26,220	191,000
Australian Commonwealth (total)	2,975,120	4,458,000
New Zealand	105,000	1,050,000
Fiji Islands	7,500	130,000
New Guinea	309,575	983,000

AREA AND POPULATION OF THE UNITED STATES AND ITS DEPENDENCIES. CENSUS OF 1910

	Square Miles
Total Area	3,743,306
Total Population	101,100,000
The Forty-eight States	91,972,000

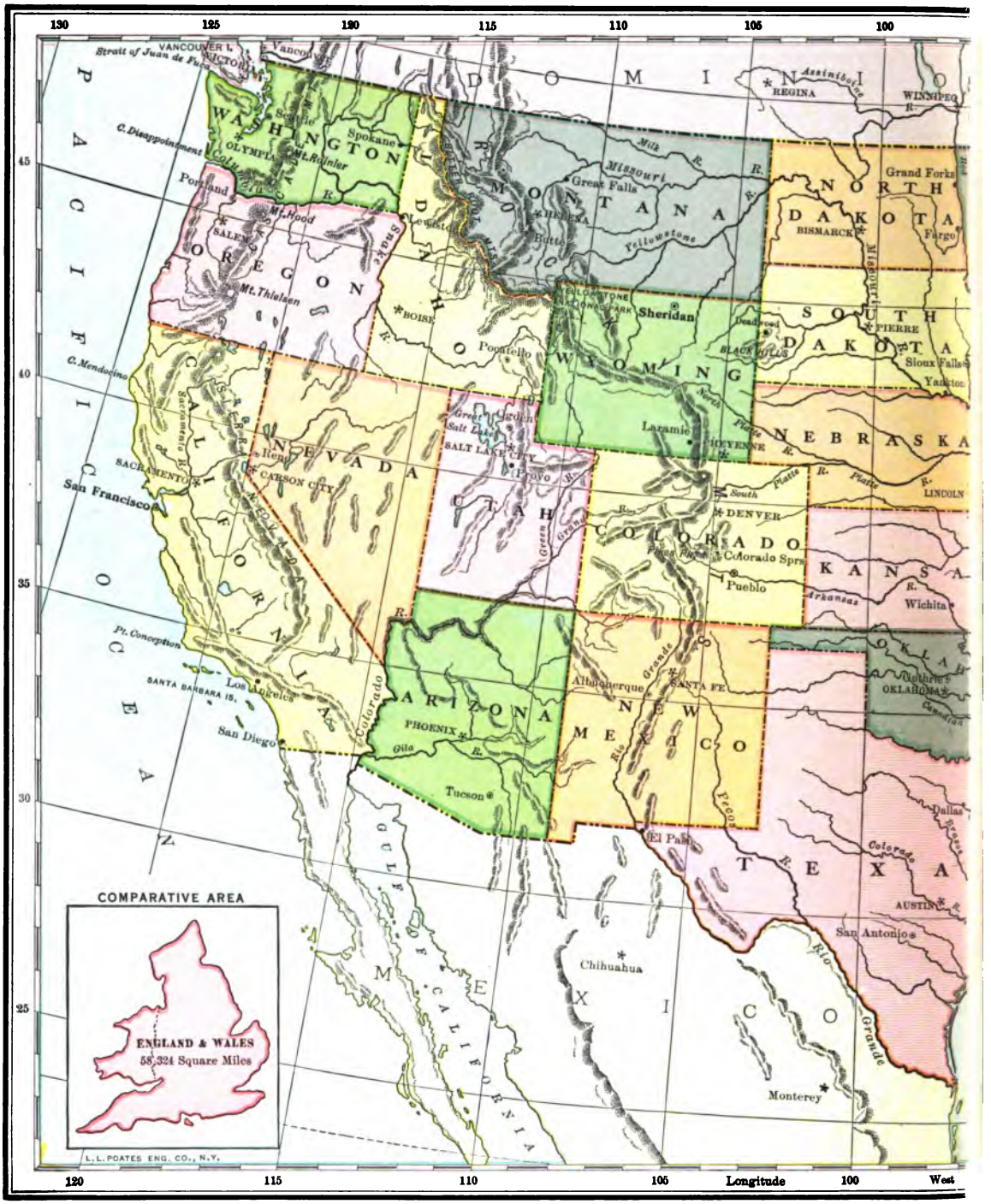
States	Area in Square Miles	Population
Alabama	51,998	2,138,093
Arizona	113,956	204,354
Arkansas	53,335	1,574,
California	158,297	2,377,
Colorado	103,948	799,
Connecticut	4,965	1,114,
Delaware	2,370	202,
District of Columbia	70	331,
Florida	58,666	752,
Georgia	59,265	2,609,
Idaho	84,313	325,
Illinois	56,665	5,638,
Indiana	36,354	2,700,
Iowa	56,147	2,224,
Kansas	82,158	1,680,
Kentucky	40,598	2,289,
Louisiana	48,506	1,656,
Maine	33,040	742,
Maryland	12,327	1,295,
Massachusetts	8,266	3,366,
Michigan	57,980	2,810,
Minnesota	84,682	2,075,
Mississippi	46,865	1,797,
Missouri	69,420	3,293,
Montana	146,572	376,
Nebraska	77,520	1,192,
Nevada	110,690	81,
New Hampshire	9,341	430,
New Jersey	8,224	2,537,
New Mexico	122,634	327,
New York	49,204	9,113,
North Carolina	52,426	2,206,
North Dakota	70,837	577,
Ohio	41,040	4,767,
Oklahoma	70,057	1,657,
Oregon	96,699	672,
Pennsylvania	45,126	7,665,
Rhode Island	1,248	542,
South Carolina	30,989	1,515,
South Dakota	77,615	583,
Tennessee	42,022	2,184,
Texas	265,896	3,896,
Utah	84,990	373,
Vermont	9,564	355,
Virginia	42,627	2,061,
Washington	69,127	1,141,
West Virginia	24,170	1,221,
Wisconsin	56,066	2,333,
Wyoming	97,914	145,
Alaska	590,884	64,
Hawaii	6,449	191,
Porto Rico	3,435	1,118,
Philippine Islands (1903)	115,026	7,635,
Guam (1900)	210	9,
Samoa (1902)	77	3,
Canal Zone (1909)	474	127,
Military and naval persons abroad (1900)		91,


ARCTIC
OCEAN
ATLANTIC
PACIFIC
GREENLAND
ICELAND
Denmark Strait
JAN MAYEN I.
FAROE IS.
Davis Strait
BAFFIN BAY
HUDSON BAY
Hudson Strait
Fox Channel
DOMINION OF CANADA
UNITED STATES
NEWFOUNDLAND
NOVA SCOTIA
BERMUDA IS.
Boston
New York
Philadelphia
Quebec
Montreal
OTTAWA
Toronto
Buffalo
Chicago
St.Louis
St.Paul
Minneapolis
Milwaukee
Cincinnati
Louisville
Charleston
Savannah
Jacksonville
Birmingham
Memphis
Mobile
New Orleans
Little Rock
Kansas City
Omaha
Fargo
Bismarck
Denver
Pueblo
Dallas
Winnipeg
Lake Winnipeg
Regina
Edmonton
Calgary
Great Slave Lake
Great Bear Lake
Lake Athabaska
Mackenzie R.
ARCTIC CIRCLE
Portland
San Francisco
Sacramento
Los Angeles
San Diego
Salt Lake City
VANCOUVER I.
Victoria
QUEEN CHARLOTTE IS.
PRINCE OF WALES I.
Sitka
Mt.St.Elias
Mt.Fairweather
Dawson
Nome
Bering Strait
BERING SEA
ST.LAWRENCE I.
ST.MATTHEW I.
NUNIVAK I.
UNIMAK I.
UNALASKA I.
Bristol Bay
WRANGELL I.
Pt.Hope
C.Barrow
ASIA
NORTH POLE
Longitude West from Greenwich

MAP STUDIES. (1) What kind of map is this? (2) How are the mountains indicated? The rivers? The different countries? The oceans, lakes, seas, etc.? (3) What is the scale of miles on this map? What other maps are drawn to the same scale? (4) Using the scale of miles, measure the distance from Bering Strait to the Isthmus of Panama; from Cape Race to Vancouver Island; from Colon to Panama? (5) Compare the area of the German Empire with that of Mexico (on this map it is drawn to the same scale as the continent). Measure the greatest length of the German Empire, and compare with the distance from New York to San Francisco. (6) How does the German Empire compare in area with the United States? (7) What are the two largest countries in North America? (8) Compare the areas of Mexico and Alaska. (9) Name the seven divisions of Central America. (10) What two islands northeast of Canada? (11) To what country does Newfoundland belong? (British possessions are tinted red). (12) What are the two divisions of the island of Haiti? (13) Between what two parallels is the greater part of North America? (14) What meridian crosses the central part of the continent? (15) In what longitude is New Orleans? San Francisco? Montreal? Washington? (16) What is the latitude of Colon? Of Mexico City? Of Cape Farewell? Of Nome, Alaska? (17) How is Baffin Bay connected with the Arctic Ocean? With the Atlantic? (18) What strait separates Labrador from Newfoundland? (19) What bay between Nova Scotia and the mainland? (20) What bay on the eastern coast of the United States? (21) What group of islands east of the United States? What two groups southeast? (22) What chain of islands extends from the coast of South America northward, partly enclosing the Caribbean Sea? (23) What gulf on the west coast of Mexico? (24) Name two inlets on the coast of Alaska. (25) What mountain in Alaska is the highest point on the continent? (26) What is the direction of the St. Lawrence River? What gulf at its mouth? (27) Name four islands in or near the Gulf of St. Lawrence. (28) What large river flows into Hudson Bay? In what lake does it rise? What river flows into this lake? (29) Name the four largest tributaries of the Mississippi River. (30) What river flows into the Gulf of California? (31) What four lakes on the border of the United States? (32) What large lake is entirely within the United States? (33) What lake in the western part of the United States has no outlet? (34) What lake in Central America? (35) What is the capital of the United States? Of Mexico? Of Canada? Of Alaska? Of Cuba? (36) What two cities on the St. Lawrence River? (37) What city at the mouth of the Missouri River? (38) What city near the mouth of the Mississippi? Of the Columbia? (39) What is the chief city on the Pacific Coast of the United States? (40) What city on Vancouver Island? (41) Give the location of each of the following cities: Chicago, Vancouver, Toronto, Buffalo, St. John's, Halifax, Havana, Colon, Vera Cruz, and San José. (42) Find the distance in miles between New York and Chicago; between New Orleans and St. Paul; between Montreal and New York; between Colon and New York; between Panama and San Francisco. (43) Compare the distance between New York and San Francisco by land with the distance by water, by way of the Panama Canal.

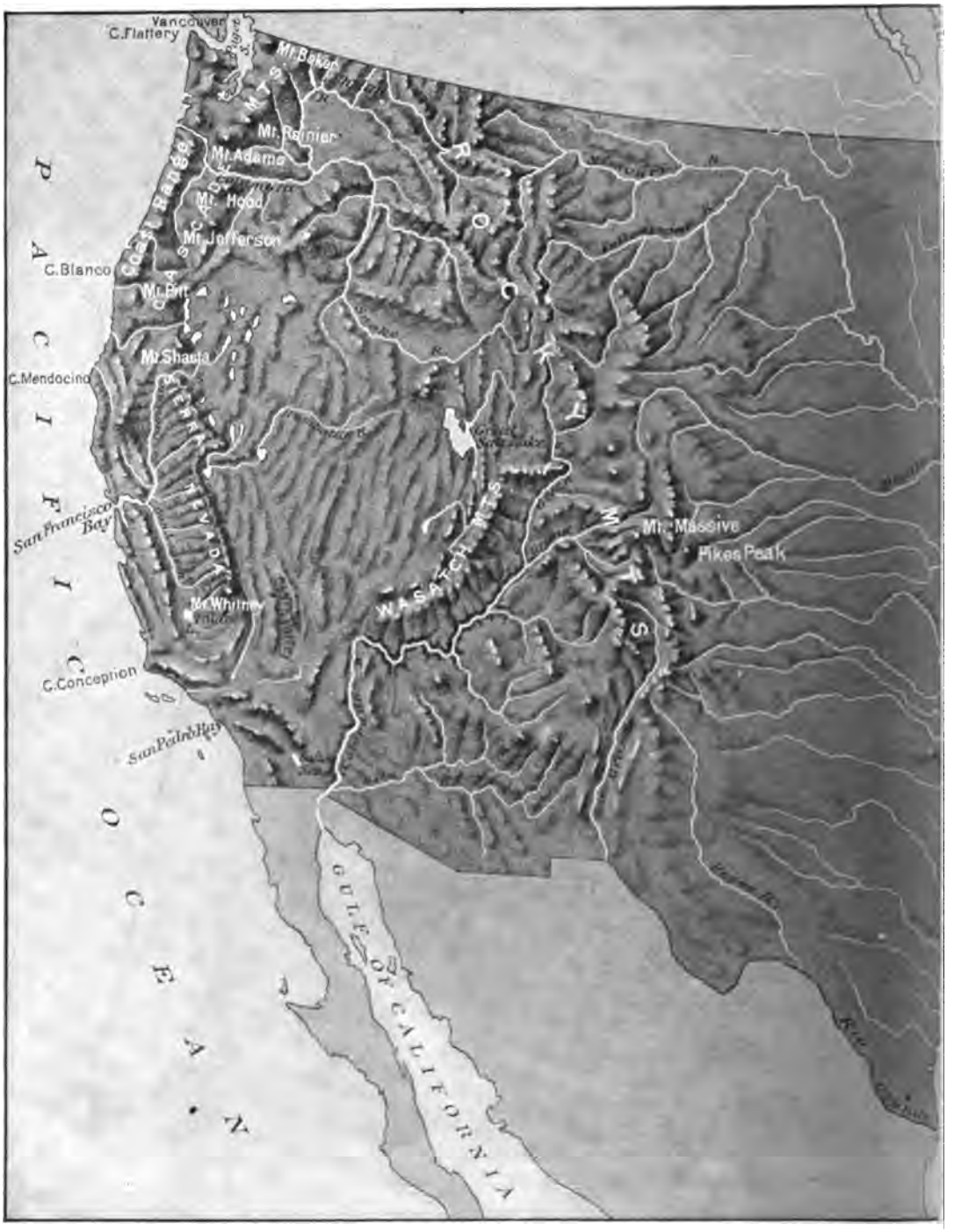
MAP STUDIES. This is called a *Relief Map* because it shows the varying elevation of the land. The darkest tint indicates mountains, the gray tints, plains, and the white, waters. In studying the Relief Maps in this book notice (1) the location of the mountains and the general direction of mountain ranges. (2) Learn the names of the chief mountain ranges and some of the mountain peaks. (3) Notice that some parts of the map tinted gray lie between mountain ranges; these are plateaus. Other plateau regions lie between the head waters of rivers that flow in different directions, such as the Laurentian Plateau in Labrador. Remember that the scale of this map is 650 miles to the inch, and, therefore, although these plateau regions appear *small* on the map they are really very large. (4) Find out the great *slopes* of the continent and their direction, by noticing the direction of rivers and river systems. Trace the dividing ridges between drainage systems; for example, you may trace the great "Continental Divide" from the northern coast of Alaska along the summits of the Rocky Mountains and the Sierra Madre all the way to the Isthmus of Panama. (5) Study the coast line and observe where it is regular and where irregular; try to explain the reason for this difference. (6) Learn the name and location of each important feature of the map. (7) Make a copy of the map.

QUESTIONS. (1) What is the direction of the Rocky Mountains? (2) Into what slopes do they divide the continent? (3) Which is the greater of these, the Atlantic or the Pacific Slope? (4) Name three mountain ranges west of the Rocky Mountains. (5) What mountain peak in the Sierra Nevada range? (6) What is the direction of the Appalachian Highland? (7) What plain between this highland and the Atlantic Ocean? (8) What name is given to the interior of North America? (9) Into what two slopes is the Great Central Plain divided? (10) Trace the dividing ridge between these two slopes. (11) What great lakes in the southern part of the Laurentian Plateau? (12) What lakes do you find in the northern part of the continent? Name the outlets of four of these lakes? (13) Notice that the northern half of the continent has many lakes and the southern half, very few; can you explain this difference? (14) The northern half of the continent has many islands and inlets along the coast, while the southern half has very few; what reason can you give for this? (15) Name and give the location of eight large islands near the coast of the continent. (16) What four peninsulas along the eastern coast? (17) Name two peninsulas on the western coast. (18) What waters are connected by each of the following straits: Davis, Hudson, Bering, and Florida? (19) Name eight capes on the coast of the continent. (20) What large sea and gulf southeast of the continent? (21) Give the source (lake or mountains), the direction, and point of discharge of each of the following rivers: Mississippi-Missouri, St. Lawrence, Mackenzie, Yukon, Columbia, Colorado, and Nelson. (22) What bodies of land are separated by each of the straits named in question (18)? (23) What continent is connected with North America by the Isthmus of Panama? (24) What other isthmus do you find on the map? (25) In what zone is the greater part of North America? (26) In what zones are the northern and southern parts? (27) Tell something about the direction of the sun's rays in each of these zones.

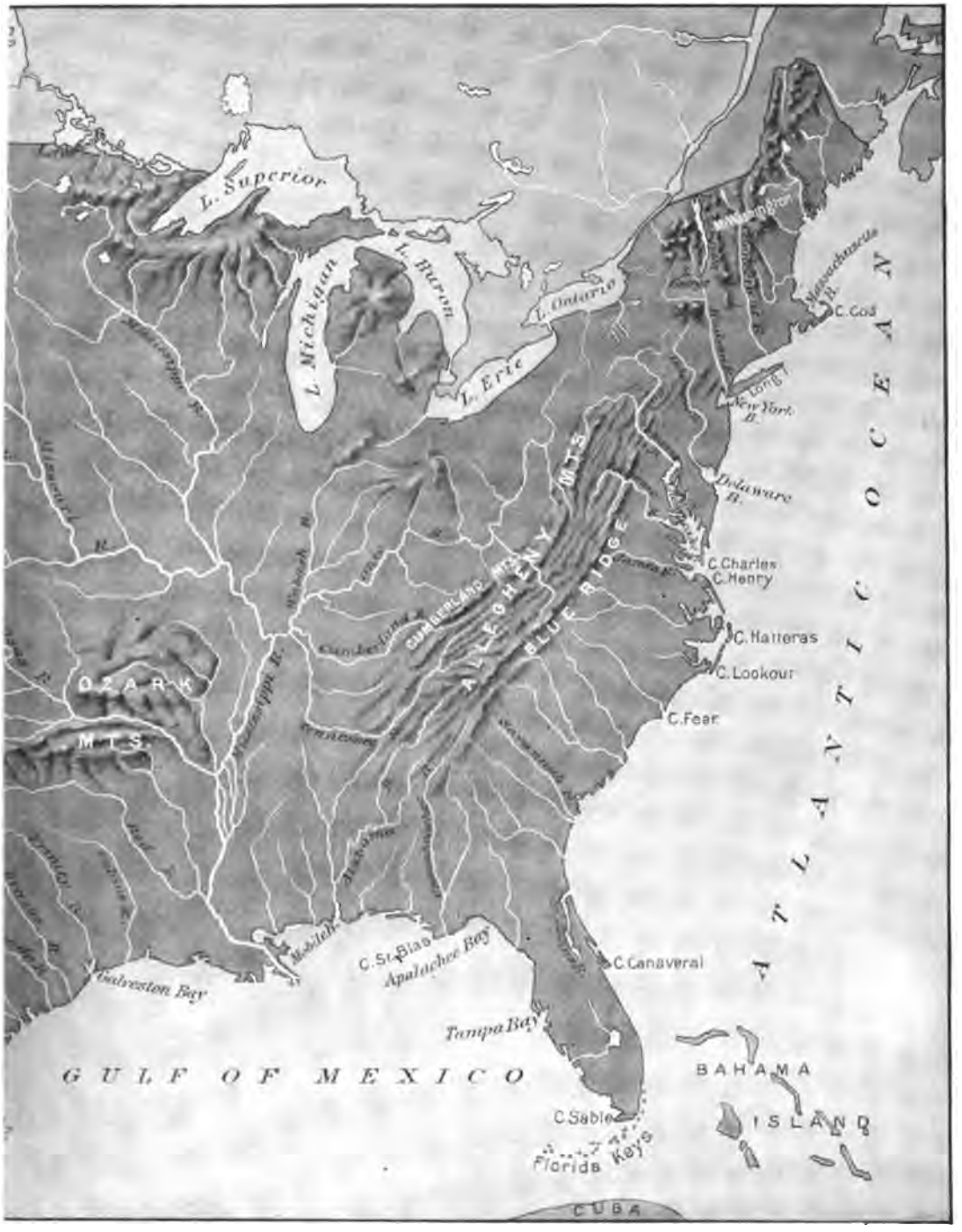


MAP STUDIES. (1) What ocean borders the United States on the east? What gulf on the south? (2) Name four lakes on the northern border. (3) What country on the north? On the south? (4) Between what parallels is the United States? Between what meridians? (5) Lay off the scale of miles on a slip of paper and measure the length of the United States along the parallel of 40° from east to west; measure its breadth from north to south. (6) What states are crossed by the Rocky Mountains? By the Appalachians? By the Sierra Nevada and Cascade ranges? (7) Name the states bordering the Atlantic Ocean; bordering the Gulf

of Mexico; the Pacific Ocean. (8) What states are separated by the Ohio River? By the Mississippi? By the Missouri? By the Colorado? By the Columbia? (9) Name the states bordering on the Great Lakes. (10) Which is farthest north — Maine or Minnesota? (11) Which is farthest south — Texas or Florida? (12) Which is the most eastern state? The most western? (13) Draw the outline of the United States and fill in the state boundaries, and the names of the states. Draw in the Mississippi River and its four largest branches. Draw in and name the Great Lakes and the ten largest cities, a list of which is given in Appendix II.



MAP STUDIES. (1) What three mountain ranges near the Atlantic Coast? What is their direction? To what system of mountains do they belong? (2) What name is given to the land between the Appalachian Highlands and the Atlantic Ocean? (3) What three rivers cross the Appalachian Highlands? (4) Trace the Mississippi River from the Gulf of Mexico to its source; trace also the Missouri and the Colorado to their sources. (5) In what mountains do these rivers rise? (6) Name two high peaks of the Rocky Mountains? How high are they? (See *page 305*) (7) What three mountain ranges near the Pacific Coast? (8) What



large river crosses these ranges? (9) What two rivers unite near the head of San Francisco Bay? (10) What high peaks in the Sierra Nevada Mountains? In the Cascade Mountains? (See *page 305* for heights.) (11) What mountains in the Great Central Plain? What river crosses them? (12) Name the Great Lakes. (13) What does the Relief Map tell you about the surface of the land bordering the Great Lakes? (14) What minerals are found in these low mountains? **(See *page 314*)**